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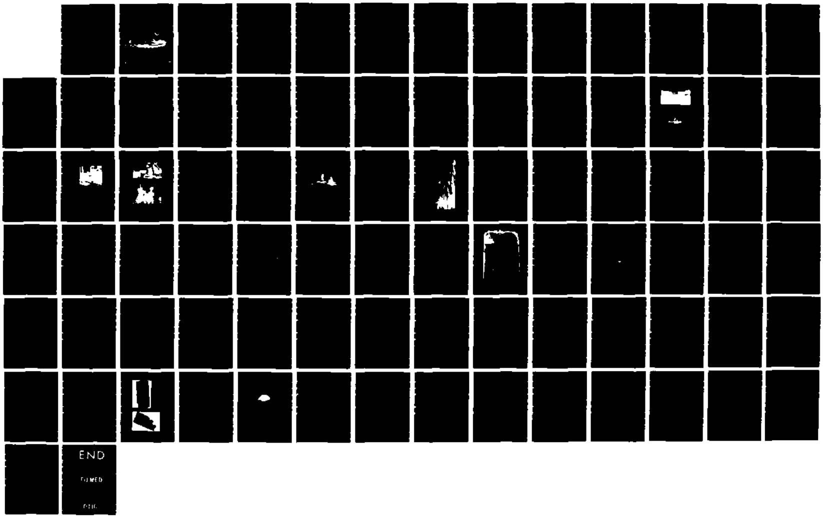

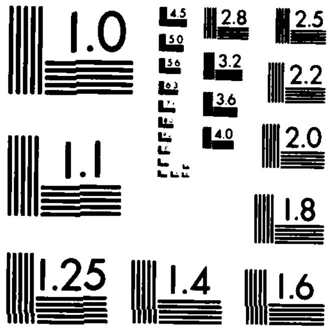

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REPORT NO. COESAM/PD-EC-85-001

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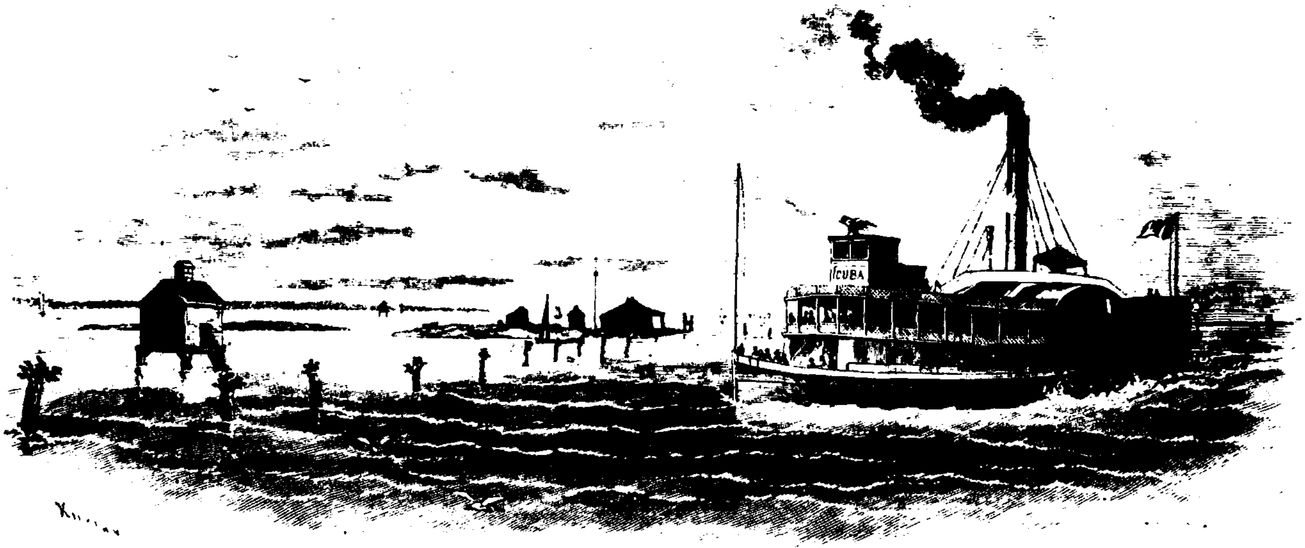

PREPARED FOR:
U. S. ARMY CORPS OF ENGINEERS,
MOBILE DISTRICT

PREPARED BY:
ESPEY, HUSTON AND ASSOCIATES, INC.
AUSTIN, TEXAS

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The archaeological testing of a section of Confederate harbor obstructions (1Mb28) in Mobile Bay has been completed. The present study included the detailed examination of one of the three scuttled vessels which form the western line of the harbor obstructions. A second craft in the obstructions was tested to ascertain its construction; a third remains unexamined, although its presence was verified.

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20. ABSTRACT (Cont.)

The archaeological and historical data developed during this project confirms the theories advanced in the report of the site's original discovery. The tested vessel has been identified as the river steamboat Cremona, which is bordered on the north by a small flat and on the south by another large steamboat. Constructional details have been ascertained for the Cremona and the flat (Components A and B of 1Mb28).

A mitigation plan for Component C, believed to be the Gulf steamboat Carondelet, as well as suggestions for further lines of research along the rest of the line, are presented to the Corps of Engineers, Mobile District.

Report No. COESAM/PD-EC-85-001
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ARCHAEOLOGICAL TESTING OF THE CONFEDERATE OBSTRUCTIONS, 1Mb28, MOBILE HARBOR, ALABAMA

Funded by:

U.S. Army Corps of Engineers, Mobile District
under the provisions of
Contract DACW01-83-C-0124
Modification P-0003

Principal Investigator:

Clell L. Bond

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Submitted by:

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July 1985

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ABSTRACT

The archaeological testing of a section of Confederate harbor obstructions (1Mb28) in Mobile Bay has been completed as part of a planned harbor expansion and improvement by the U.S. Army Corps of Engineers, Mobile District. The study developed as the result of the discovery of the obstructions during the archaeological testing of submerged anomalies in 1983. The present study included the detailed examination of one of the three scuttled vessels which form the western line of the harbor obstructions. A second craft in the obstructions was tested to ascertain its construction; a third remains unexamined, although its presence was verified.

The archaeological and historical data developed during this project confirms the theories advanced in the report of the site's original discovery (Irion and Bond 1984). The tested vessel has been identified as the river steamboat *Cremona*, which is bordered on the north by a small flat and on the south by another large steamboat. Constructional details have been ascertained for the *Cremona* and the flat (Components A and B of 1Mb28).

A mitigation plan for Component C, believed to be the Gulf steamboat *Carondelet*, as well as suggestions for further lines of research along the rest of the line, are presented to the Corps of Engineers, Mobile District, for future planning of the Mobile Bay Project.

Acknowledgements

The author gratefully acknowledges the support and assistance of the many people who contributed to the successful completion of this study.

Ms. Dorothy Gibbens, marine archaeologist for the U.S. Army Corps of Engineers, Mobile District, is acknowledged for her competent handling of the dual roles of project monitor and Corps diving supervisor on behalf of the federal government.

Clell L. Bond, principal investigator for the project, provided guidance and advice throughout all phases of the study and kept the project on course.

The EH&A field crew in Mobile was composed of Jack Irion, Stephen James, Paul Teas, Thomas Jackson, Robert Gearhart and Todd Hannahs.

Robert Rouse, EH&A draftsman, is acknowledged for his assistance in preparing the drawings and illustrations for the report.

TABLE OF CONTENTS

ILLUSTRATIONS

I. PROJECT HISTORY

Mobile Bay has been the focus of numerous cultural resource surveys which have occurred in conjunction with the oil and gas industry and projects of the U.S. Army Corps of Engineers (Corps) which have been directed toward improving the existing ship channel. The present work grew out of an initial study conducted in 1982 for the Corps by OSM Archaeological Consultants, Inc. (Mistovich and Knight 1983a, b), which included a literature and archival search and remote sensing survey of Mobile Bay from the outer bar channel in the Gulf of Mexico to the Interstate-10 tunnel at the mouth of the Mobile River. The result of this survey was the location of 603 magnetic anomalies scattered throughout the length of the bay. The OSM document has subsequently served the Corps of Engineers, Mobile District, as a guide to the selection of anomalies for Phase II cultural resource investigation as they become potentially affected by harbor and channel development.

The anticipated dredging of two areas, a Turning Basin at the head of the bay adjacent to the MacDuffie Coal Terminal and a Transshipment Facility in the south, just above Ft. Morgan, required an underwater inspection of the magnetic anomalies by nautical archaeologists (Fig. 1). Espey, Huston & Associates, Inc. (EH&A) was employed in 1983 to conduct this investigation under U.S. Army Corps of Engineers Contract No. DACW01-83-C-0124. The intent of this work was to relocate and analyze 12 submerged anomalies as potential historic and prehistoric cultural resources and evaluate their potential eligibility to the National Register of Historic Places (NRHP).

Only one of the 12 anomalies investigated, TB-4-3, was of potential archaeological significance. At the time of its discovery, TB-4-3, located in upper Mobile Bay, was found to be a long mound of hand-made bricks contained within a double row of pilings (Irion and Bond 1984). Through subsequent research at the National Archives in Washington, D.C., the mound of bricks was identified as a section of the harbor obstructions installed by the Confederate Corps of Engineers during the Civil War. In the area to be affected by the proposed Turning Basin, the obstructions consisted, in part, of ships loaded with brick which were scuttled across the old natural river channels. The ships were held in place by pilings. A detailed account of the construction and tactical importance of the obstructions may be found in Irion and Bond's Identification and Evaluation of Submerged Anomalies, Mobile Harbor, Alabama (1984).

When it became evident that TB-4-3 was of potential National Register significance as a Civil War era shipwreck, the Corps modified EH&A's contract to require additional testing of the site to determine:

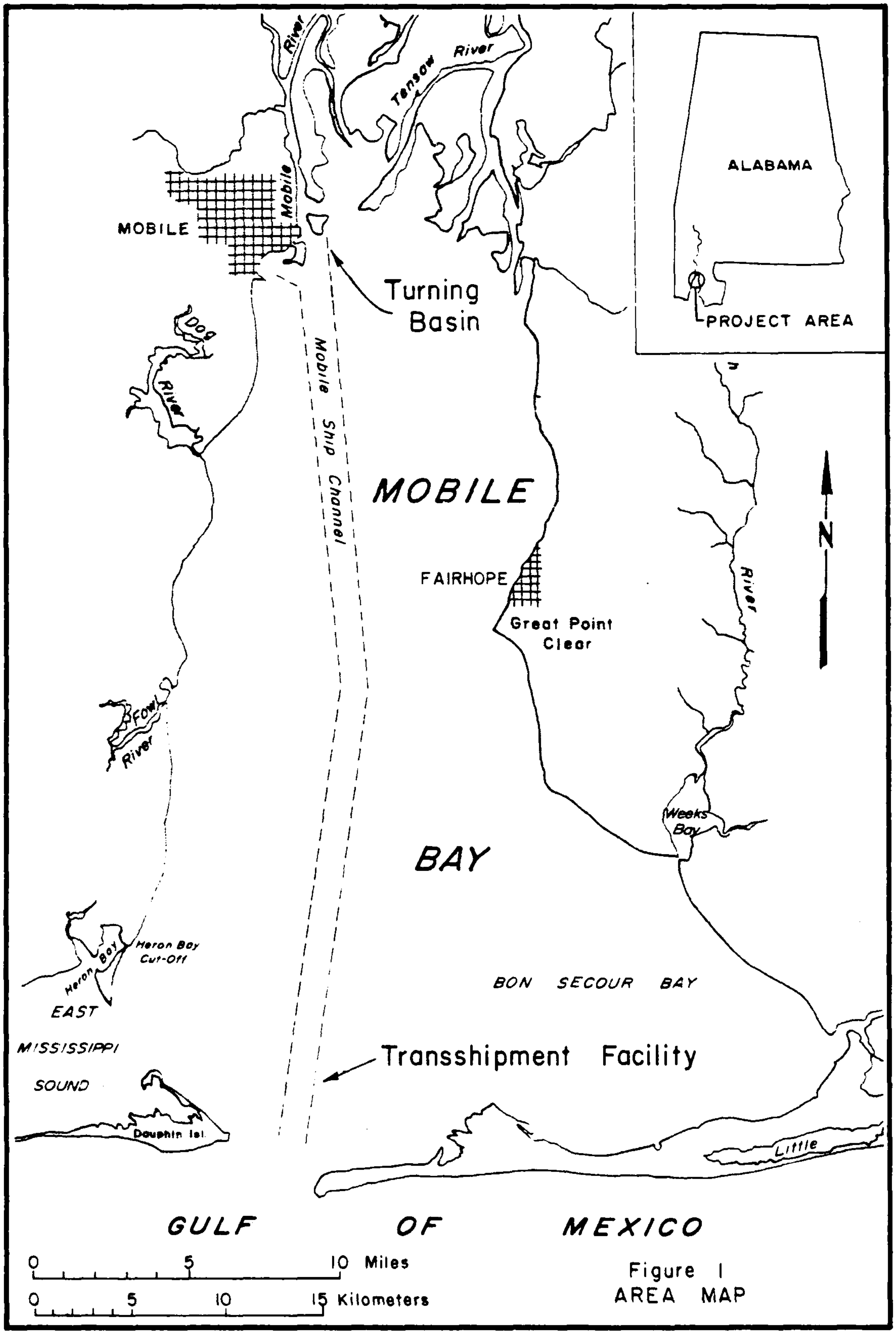


Figure 1
AREA MAP

(a) if a ship existed under the mound of brick at TB-4-3, (b) the condition of the ship, and (c) her spatial limits and construction methods. Field work was initiated on September 4, 1984, and was completed on October 26, 1984. In addition to gathering the information required by the contract, EH&A archaeologists were able to identify the vessel as the steamboat Cremona and located two additional vessels in the line of obstructions. These vessels will also be impacted by the proposed Turning Basin. The entire line of obstructions has been assigned site number 1Mb28. The investigated hull at TB-4-3, identified as the Cremona, is designated as Component A of this site.

The cultural resource study of Component A of 1Mb28, now identified as the Cremona, represents a comprehensive testing program in accordance with the Corps' responsibilities for cultural resources under the National Historic Preservation Act of 1966 (PL 89-655) as amended, the National Environmental Policy Act of 1966 (PL 91-190), Executive Order 11593, and the Archaeological and Historical Preservation Act of 1974 (PL 93-291).

II. THE CONFEDERATE OBSTRUCTIONS

A detailed account of the emplacement of the obstructions by the Confederate Corps of Engineers in Upper Mobile Bay was published by EH&A in 1984 (Irion and Bond 1984:55). It is appropriate, in connection with the current study, to review these findings and to assess the site and its present conditions.

THE PLACEMENT OF THE OBSTRUCTIONS

With the lack of a strong navy capable of defending the long coastline of the southern states, Confederate defensive strategy evolved into a heavy reliance on the use of obstructions and exploding mines (Sheliha 1868:219f). The wisdom of this strategy was reinforced by the realization that masonry forts, such as forts Morgan and Gaines at the mouth of Mobile Bay, were no longer adequate to repulse a concerted naval attack from ships armed with rifled, exploding projectiles. The South learned this lesson early in the war with the fall of New Orleans and Pensacola in 1862.

With the loss of New Orleans and Pensacola as friendly Gulf ports, Mobile's importance became paramount to the survival of the Confederacy as a political entity. Mobile was the closest port for the trade with Cuba in much needed European munitions and medicines. Additionally, she became the major outlet for the export of southern cotton, the Confederacy's only viable medium of exchange which allowed her to purchase war material overseas. Her defense then became a prime concern of the Confederate government and was pursued with the best resources that could be mustered. As a result of their efforts, Mobile remained open to blockade runners for three more years and it has been estimated that this important source of resupply delayed the end of the war by a year or more (Fleming 1911:188).

The defense of the city was keyed to five main points (Fig. 2). On the landward or western side of the city, a series of trenches and earthen forts were constructed between 1861 and 1864, making Mobile impregnable from a land attack (Nichols 1959:186). An attack from the north was guarded against by raft obstructions and a battery at Owen Bluff, on the Alabama River above Mobile. Two batteries, Huger and Tracy, accompanied by pile and torpedo obstructions, prevented entrance into the bay from the Apalachee and Blakely Rivers which were further guarded by earthenworks at Spanish Fort. This area was recognized by the Confederate engineers to be the weakest point in the defensive system and was the focus of the Union attack which resulted in the fall of Mobile, despite bloody resistance, on April 12, 1865.

It had been noted, during the previous examination of the anomaly in 1983, that the mound of bricks actually seemed to consist of separate, elongated mounds with gaps of as much as 30 ft (9 m) between them. It was assumed at the time that the gaps represented spaces between the ships and a plan for locating the trenches was formulated on the basis of this assumption. Closer examination of the two gaps (originally thought to be the northern and southern terminations of the ship at TB-4-3) proved this hypothesis to be erroneous.

The first trench, Trench A, was established near what was thought to be the approximate center of the mound based in part on the distance between two "gaps" (Fig. 9). The positioning of Trench A at the exact center of the ship was not considered to be of paramount importance as long as it fell somewhere within the ship away from either end. The trench was intended to provide basic information on the interior of the ship as a representative sample of the middle hull construction. It was also presumed that the orientation of the vessel, as determined from the excavation, would aid in locating the two ends. The position was also selected at a point where the overburden was fairly shallow (about 1.5 ft (0.4 m)) and where anomalous readings were recorded during a brief magnetic survey of the area (Fig. 10).

A grid of galvanized metal pipe and yellow polypropylene line was established over the section designated as Trench A. The grid was 49.5 ft (15 m) wide on the east-west axis and 13.2 ft (4 m) wide on the north-south axis. The northwest and northeast corner stakes were designated as datum points and a positioning fix was taken on them using an electronic distance meter. The 1.5 inch (3.8 cm) galvanized pipes were jetted 5 ft (1.5 m) into the bottom and were left in place at the close of field work as permanent markers.

The dive barge, a 24 ft (7.3 m) by 20 ft (6 m) steel flat, was anchored to the north of the trench using a three-point anchor system with each point consisting of 50 ft (15 m) of 3/4 inch (1.9 cm) nylon line, 12 ft (3.6 m) of chain and a 50 lb (22.5 kg) Danforth anchor. This system held the barge securely in place despite wind shifts and tidal changes and allowed us to leave the barge in position overnight.

The silt overburden was first cleared from the trench using a prop wash deflector attached to a 75 hp outboard motor (Fig. 11A). Previous testing had indicated that the prop wash could remove the unconsolidated sediment without disturbing the cultural component underneath. By using the prop wash, the 1.5 ft (.45 m) of overburden was cleared from the trench in about two hours while causing virtually no damage to the structure of the ship or displacement of artifacts. During the course of the prop washing operation, the engine was periodically shut down and divers were dispatched to inspect the progress of the trench and to ensure that no damage to the ship had occurred.

The prevailing winds during the project period were out of the south and kept temperatures fairly balmy throughout September and October. These winds occasionally blew as strong as 25 kts, resulting in 2- to 3-ft (0.6 to 0.9 m) seas in protected waters. The wind would, on occasion, shift to easterlies and blew out of the north for one four-day period. During the latter condition, air temperatures were reduced to as low as 45°F. Weather conditions were, on the whole, remarkably favorable throughout the project period. Only one down-day was experienced on account of thunderstorms.

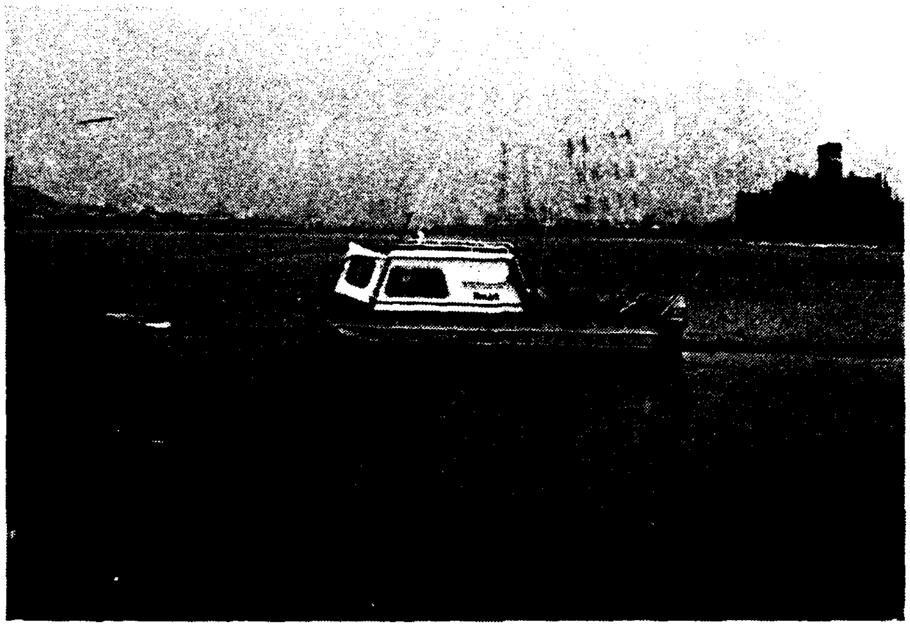
Current was almost never a significant factor during the diving operation, although it was occasionally experienced during the periods of tidal change. Wakes from passing ships caused some bottom turbulence although this was more of a nuisance than a hazard. In general, the major limiting factor to working underwater in upper Mobile Bay is the almost total lack of visibility.

Minimal diving hazards were encountered in the upper bay. The extremely shallow water made communication with the surface relatively easy. Nevertheless, the divers were constantly mindful that certain hazards do exist from breathing compressed air at shallow depth. The crucial pressure required to embolize or cause serious lung damage is equivalent to only 4 ft (1.2 m) of water. It was, therefore, extremely important not to stand up from a prone position without first exhaling.

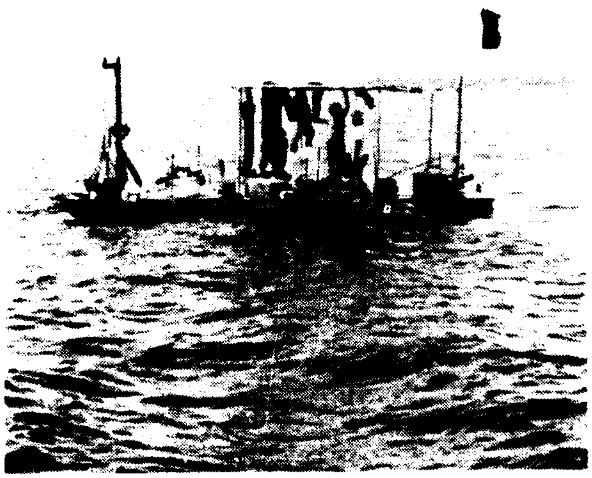
EXCAVATION

For the purposes of the contract, anomaly TB-4-3 was defined, not as the entire line of ships which forms the western arm of the Confederate obstructions, but rather as the single ship within which the coordinates for TB-4-3 fall (Mistovich and Knight 1983b). Under the contract, EH&A was obligated to define the spatial limits of the ship, locate the bow and stern, and excavate a trench amidships to the centerline. During the course of the excavation of these three trenches (bow, stern and amidships), as much as possible was to be learned regarding the condition of the hull, the depth of the brick deposit, and the technique of construction.

The excavation of Component A of site 1Mb28 presented a unique problem in nautical archaeology. According to contemporary historical records, the vessel was one of three in the western arm of the obstructions which had been stripped of anything of value, filled to capacity with bricks and other debris, and intentionally sunk in 6.5 ft (1.9 m) of water (Merrill 1866: Map A). The first problem, then, was one of defining the limits of the vessel at TB-4-3 and deciding where to locate the first trench.



21ft. MonArk Crewboat



Dive Barge Anchored
Over the Site

Figure 8
PROJECT VESSELS

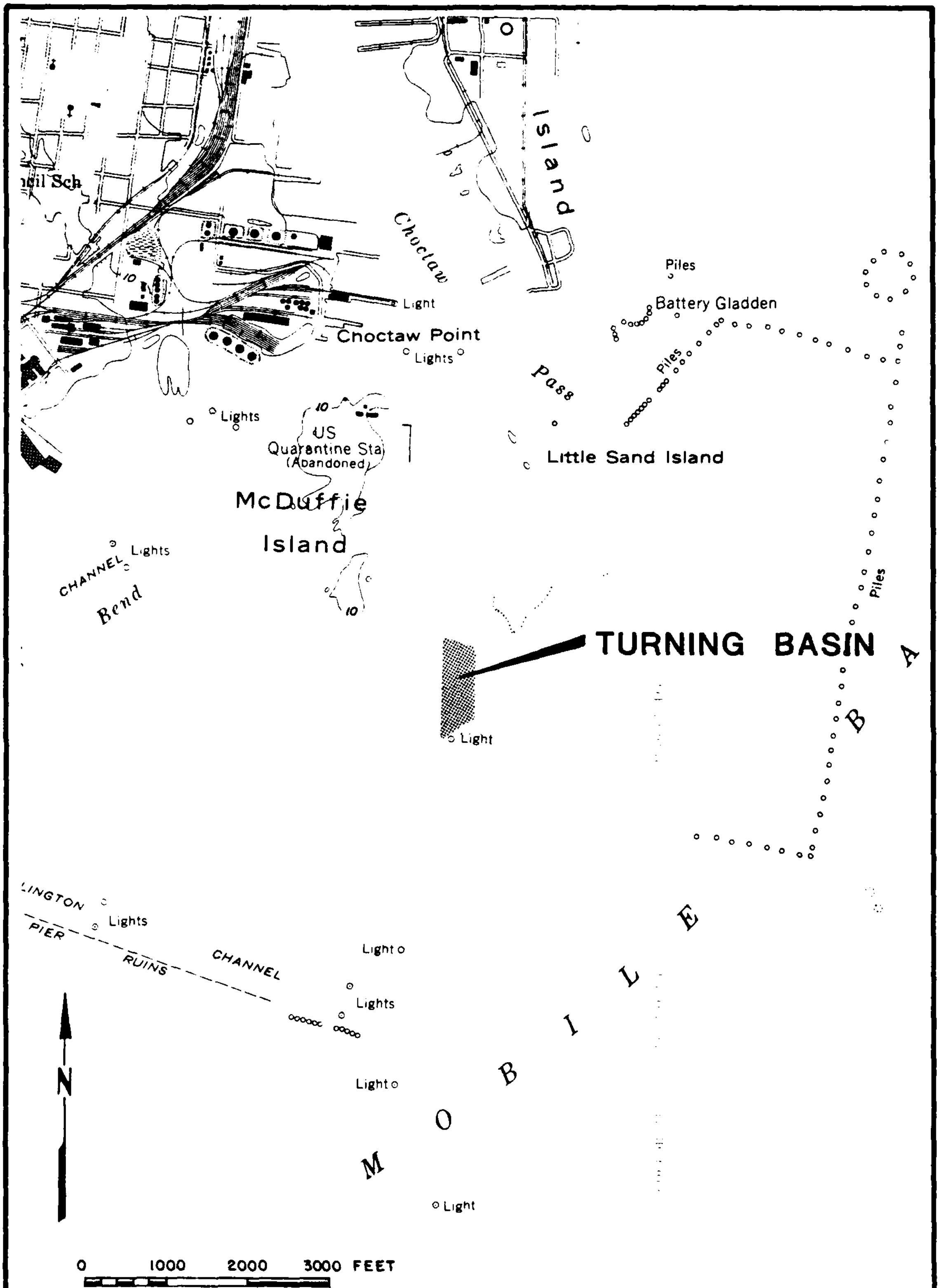


Figure 7

TURNING BASIN/ANCHORAGE AREA

III. FIELD EXCAVATION METHODS

GEOGRAPHICAL AND ENVIRONMENTAL SETTING

Archaeological site 1Mb28 lies within the boundaries of a proposed turning basin in upper Mobile Bay, Alabama (Fig. 7). The site lies to the south of Little Sand Island and is adjacent to the eastern edge of the Mobile Ship Channel. The MacDuffie Coal Terminal lies about 1,000 ft (300 m) due west of the project area on the opposite side of the channel. The main marine industrial complex of Mobile and the downtown area itself is situated a short distance to the north of the project area up the Mobile River, and is clearly visible from the site.

The major environmental conditions which most affected underwater testing of 1Mb28 were those of tide and wind. Both factors had a controlling influence on underwater visibility and the accessibility of the site.

Mobile Bay has diurnal tides of low amplitude. The mean tidal range at Main Pass is only about 1.2 ft (0.37 m), but increases to 1.5 ft (0.46 m) at the upper end near the Mobile River delta. This had the effect of increasing the average water depth over the site area from about 3 ft (0.9 m) at low tide to about 5.5 ft (1.6 m) at extreme high tide.

In general, low tide conditions were more favorable to working on the site. Particular tasks such as probing and mapping were easier to perform in waist-deep water than when the water was at the diver's eye level. The decreased water level also permitted more light to filter to the bottom, which improved visibility somewhat. This was particularly critical during the mapping phase of the excavation, as it could mean the difference between absolutely black conditions and visibility of as much as 2 ft (0.6 m). As a result, the work schedule was planned around the weekly tide table in order to maximize the most favorable conditions.

The major disadvantage to working in such shallow water lay in the limitation of the type of equipment which could be deployed over the site. Only vessels of shallow draft could reach the site, much less stay in position throughout the project (Fig. 8). Heavy, powered lifting equipment was precluded because the draft of the barge required to carry such equipment exceeded the depth of the water at low tide. As a result, all work had to be performed from a small, shallow-draft flat using a hand winch attached to a small davit. The necessity of this equipment is discussed in the following section. The crew boat used to reach the site was also required to be of shallow draft, although it was not entirely suited to the 3-foot (0.9-m) seas occasionally experienced in the bay. It was, however, a necessary compromise.

the steamer Annie, the party of dignitaries, which included Adm. Buchanan who had commanded the ram Tennessee against Farragut in the Battle of Mobile Bay, first inspected the city wharves. They then proceeded to the gap through the inner obstructions which had been widened from 200 ft (60 m) to 600 ft (182 m). This work had been completed by the time of the inspection, but the process of the removal of the ships at the outer obstructions could be witnessed from the Annie:

> "This is effected by the agency of a diver, clad in submarine armor, who goes to the bottom and deposits a torpedo, or tin cannister, containing a charge of 20 to 25 pounds of powder, as deeply as possible, amidst the heavy material to be removed. The powder is then exploded by means of an electric battery, and the loosened fragments grappled and removed by a powerful dredge machine . . . . By such means the passage through the "lower obstructions" is also to be widened to 600 feet and a clear inlet to the city from the lower bay is to be obtained."
>
> "By this time it was high noon. The order to return was given and the guests were informed that another explosion was to take place in the lower cabin of the Annie. Descending to the place designated, a battery of champagne bottles was charged by the company in the coolest manner imaginable." (Mobile Daily Register 1871:2)

With the completion of the expansion of the gaps through the inner and outer obstructions, no further destruction was recommended. The surviving vessels include not only the three in the western arm investigated by EH&A, but possibly as many as eight more in the southern line, including one extremely interesting vessel, the ironclad Phoenix. After the dredging of a new channel in 1910 to the west of the obstructions, the area has remained undisturbed.

by large charges of powder, and then remove the debris by the same means that are used for drawing piles, and by the use of a dredge boat" (Merrill 1866). Merrill notes that the removal of the wrecks will be difficult to effect because: "I am assured that these substances (brick and building debris) have gradually settled into a species of concrete very difficult to remove" (Merrill 1866).

The gaps which had been left in the line of obstructions were narrow and caused a tortuous bend in the channel which was difficult and dangerous to navigate. Merrill recommended that the gap be widened from the northwestern end where the Carondelet is lying to a point on the southern line 200 yds (182m) east of the wreck stake, which would probably include the Wm. R. King (Merrill 1866: Map C). The current site 1Mb28 is formed of the "piles and wrecks northwest of the Carondelet [which] are in such shoal water that they do not interfere with navigation, and it is thought that they will act advantageously in directing the current towards the main channel" (Merrill 1866). Merrill estimated the cost of the removal of the wrecks in 1866 to be $13,860 (Merrill 1866:54).

Between the end of the Civil War and readmission of Alabama to the Union, the economic interests in Mobile sought support from the State legislature to reopen the city to trade. In 1867, the legislature passed two acts to make it possible for Mobile to remove the war debris and dredge the sand bars. One of these acts authorized the city to issue bonds for $1 million to improve the river, harbor and bay of Mobile (Weber 1968). However, on May 5, 1870, the City Council passed a resolution to send the mayor and a committee to Washington to secure an appropriation for cleaning the channel because "the city of Mobile is unable to accomplish said object without resorting to oppressive taxation" (Municipal Archives 1870). In the 1870-71 session, Congress appropriated $100,000 for Mobile Harbor, but a controversy arose between the advocates over scouring and dredging. The Harbor Board, with General Braxton Bragg as its chief engineer, favored the scouring method which, theoretically, would force the river to dig its own channel by directing its flow with jetties. The U.S. Army Corps of Engineers, represented by Col. J. W. Simpson, maintained that this would only fill in the channel farther down and favored the dredging method. The Board eventually acquiesced, ruefully admitting that they did not have the authority "to carry out any scheme of improvement not sanctioned by the authorities of the United States" (Walker 1872).

One of the first actions directed toward the reopening of the channel was the removal of sections of the obstructions. The process was described in an article in the Mobile Daily Register of July 12, 1871 devoted to an excursion made by "a party of gentlemen . . . to take a look at the work which has been accomplished, and in progress, under direction of General Bragg, the Engineer of the Board." Setting off in

The obstructions continued to be developed over the next several months. Batteries were located at Choctaw Point (Morrow's Battery), Pinto Island Spit (Battery Gladden) and Spanish River Spit (Battery McIntosh). Battery McIntosh was the most impressive of the three, mounting six heavy guns in a casemate sheathed with railroad iron. Five rows of pilings were driven from Battery McIntosh south to the lower line. Nine rows of pilings connected the vessels of 1Mb28 to Choctaw Point Spit. A third line of pilings ran from Choctaw Point east in a line 400 yards (365 m) south of the three batteries. Gaps were left in the upper line at Spanish River and Choctaw Pass to allow passage of friendly vessels. The gap in the lower line changed several times with each feint of the Union army. The Gulf steamboat Col. Clay was sunk in what was probably the original gap adjacent to the wreck stake and Farragut's entrance into the bay prompted the sinking of the ironclad Phoenix across a channel near the center of the line. At the end of the war, the only gap through the lower obstructions was a tortuous course between the wreck stake and the south end of the Carondelet.

The construction of this defensive network was largely completed by March 1863. Leadbetter's successor, Lt. Col. Viktor Sheliha, made only minor improvements and repairs to the batteries. Additionally, a two-gun ironclad floating battery was stationed adjacent to Battery Gladden in November 1864 (Lockett 1864). Other small batteries, including Tilghman, Camel and another floating battery, were constructed in 1864 north of batteries Gladden and McIntosh. The batteries were augmented by torpedoes in Dog River, Garrows Bend, and in the channel south of the lower line of obstructions.

THE REOPENING OF THE HARBOR

In the wake of the Civil War, Mobile's harbor was in a shambles because of neglect and war debris. Failure to maintain the dredged channels at Dog River Bar and at Choctaw Pass had caused shoaling to such an extent that the channel, which had a maintained depth of 10 ft (3 m) all the way up Mobile Bay, had a depth, by 1870, of only 5.5 feet (1.6 m) through Choctaw Pass and 8 feet (2.4m) through Dog River Bar (Weber 1968). Additionally, considerable work was needed to clear the man-made obstructions which blocked most of the rivers which fed into the bay. The Blakely and Apalachee rivers were blocked by pilings and torpedoes, the Spanish River by two sunken ironclads (the Huntsville and the Tuscaloosa), Choctaw Pass by multiple rows of pilings (the upper line of obstructions), and Dog River Bar by sunken ships, loaded with brick, which were held in place by pilings (Merrill 1866).

The sunken ships caused an enormous problem for post-war engineers. In a report made by Col. W. E. Merrill of the U.S. Corps of Engineers immediately after the war, he recommended that the only practical method of removal "seems to be to blow the vessels to fragments

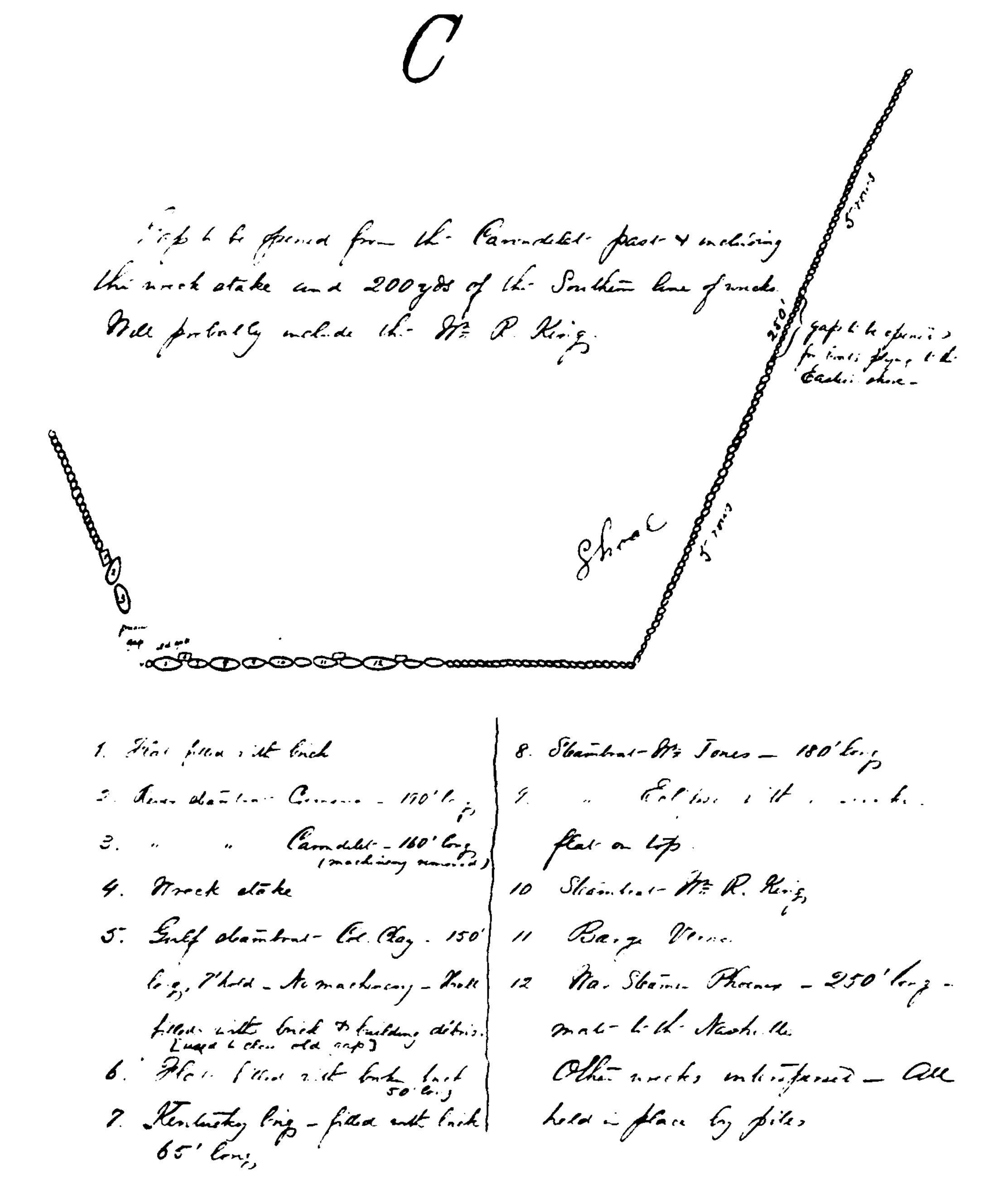


Figure 6

VESSELS SUNK, DOG RIVER BAR OBSTRUCTION

SOURCE : Merrill 1866

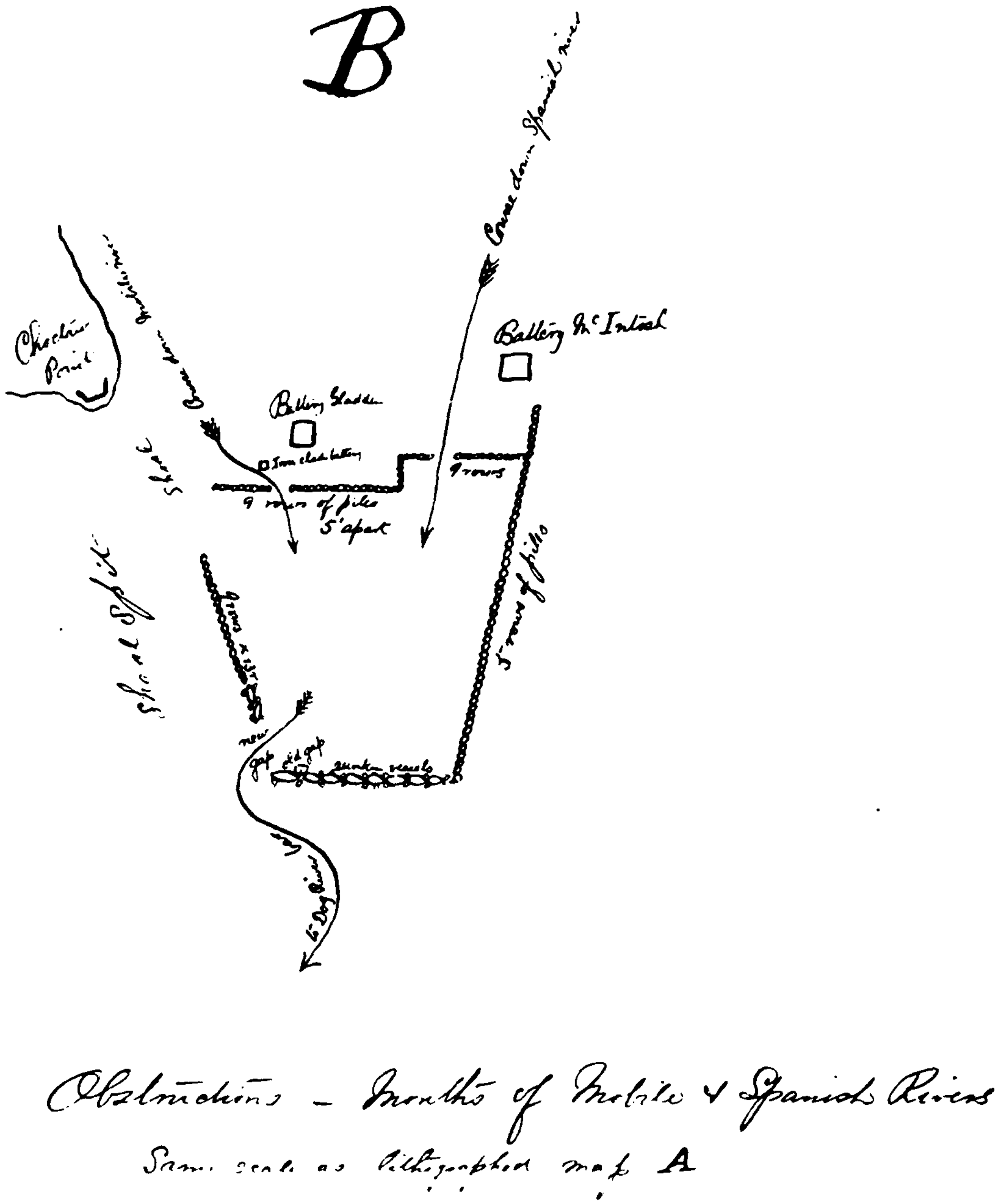


Figure 5

OBSTRUCTIONS, MOUTHS OF MOBILE AND SPANISH RIVERS

SOURCE: Merrill 1866

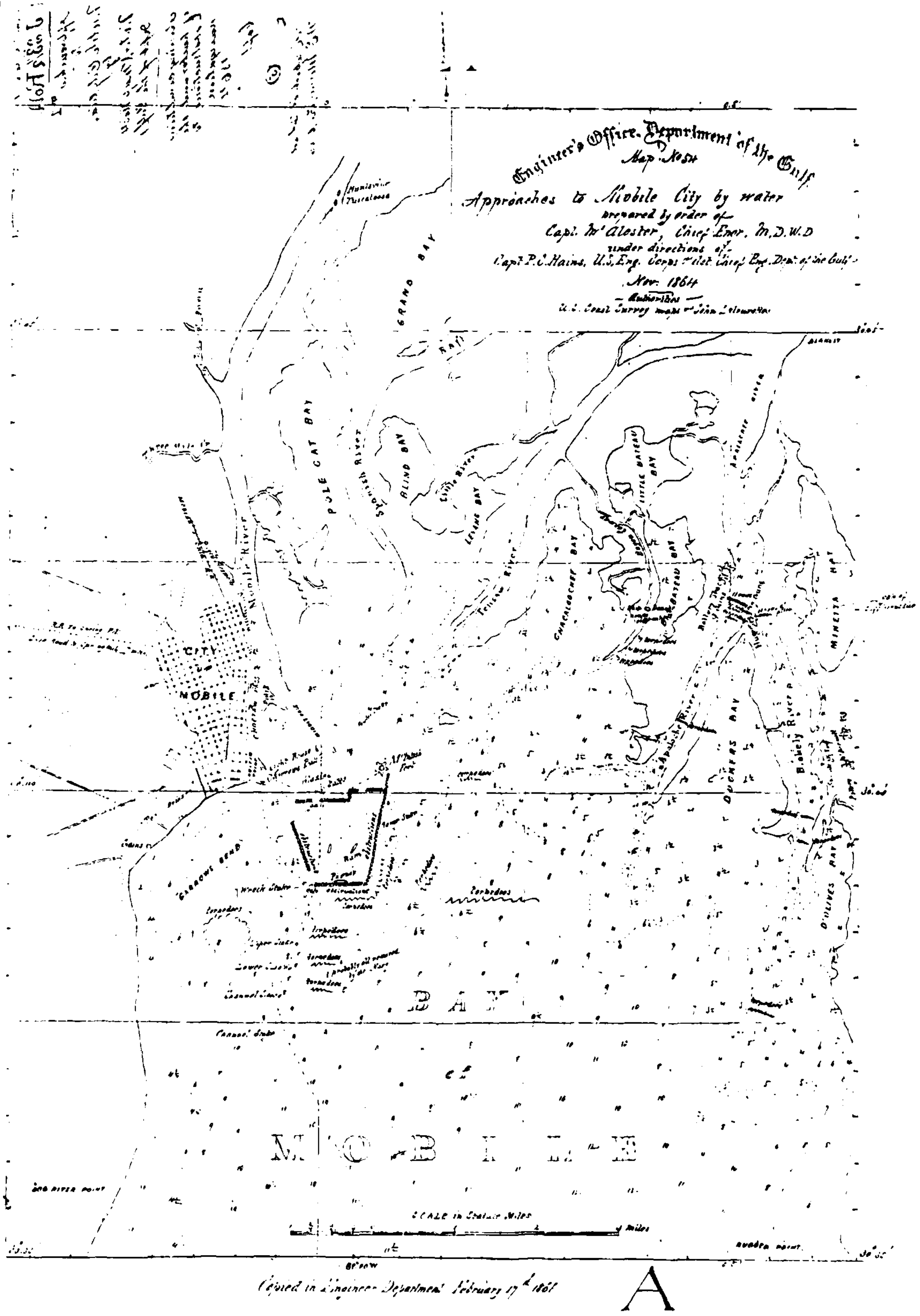


Figure 4
APPROACHES TO MOBILE CITY BY WATER (1866)

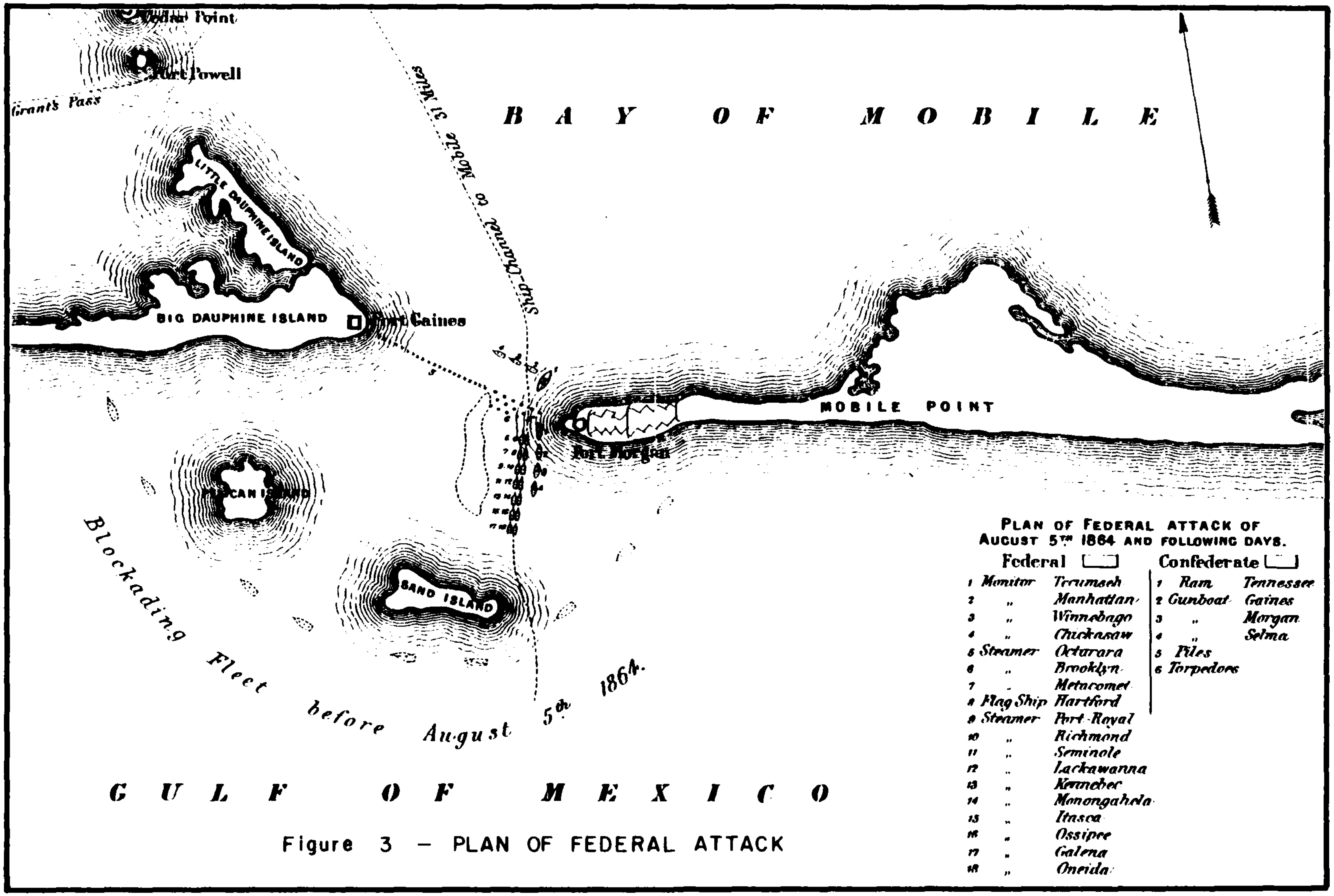


Figure 3 – PLAN OF FEDERAL ATTACK

The second weak point in the defense, and the most troublesome to correct, was the entrance through the mouth of the bay itself (Fig. 3). Two masonry forts were already in existence before the beginning of the war: Fort Morgan on Mobile Point and Fort Gaines on Dauphin Island. Both were rendered obsolete by the invention of the rifled cannon which was capable of reducing them to rubble from a comparatively safe range. The Confederates expended an enormous amount of effort to prevent this, including banking earth around the walls to absorb the force of the exploding projectiles. Various attempts were also made to block the passage of ships through the channel, none of which were successful. The engineers faced two major problems in this task: first, a gap which had to be left to permit the entrance of the blockade runners, and second, the environment of the area which defeated the best efforts of nineteenth century technology. The entrance to the bay is over 3 miles (4.8 km) wide and 60 ft (18 m) deep with stiff currents sometimes exceeding 2 kts. Log booms, rock filled cribs, and chevaux-de-frise were all tried and swept off by the current. The defenders were eventually forced to settle for a combination of pilings and floating torpedoes. Pilings barred the shallow entrance from Fort Gaines to within a few hundred yards of Fort Morgan. Torpedoes were anchored across the deeper channel. A space of 160 yards (146 m) was left from the Fort Morgan shore to allow the passage of friendly vessels (Maury 1864). When Farragut led the Union fleet into the bay on August 5, 1864, he avoided running under the guns of the fort in favor of a course leading directly through the line of torpedoes. A previous reconnaissance had reported that the spring mechanisms of the weapons had all been fouled by corrosion from their months of submersion in sea water. With one notable exception, the one which brought the ironclad <u>Tecumseh</u> to her grave, they all failed to explode and the Union fleet entered the bay.

The fifth point of defense guarded the entrance of the city from the south, up the Mobile River through Choctaw Pass. The present report is concerned with a section of these works known to their contemporaries as the Dog River Bar obstructions (Figs. 4 and 5).

The Dog River Bar obstructions were largely completed over a period of 10 months from May 1862 to February 1863 under the supervision of two engineers, Capt. Charles T. Liernier and General Danville Leadbetter. Liernier was primarily responsible for the outer line of obstructions which consisted of a line of steamboats, barges, and flatboats which were loaded with brick and debris and sunk across the channel at Dog River Bar (Irion and Bond 1984:42-45, 63-85). The sunken vessels actually formed two lines: the main line ran from a wreck stake east across the channel while a secondary line, consisting of three vessels, went from the wreck stake north toward Choctaw Point Spit (Fig. 6). These three vessels, which figure in the present study under the site number 1Mb28, are (from north to south) a flat, the steamboat <u>Cremona</u> and the steamboat <u>Carondelet</u>.

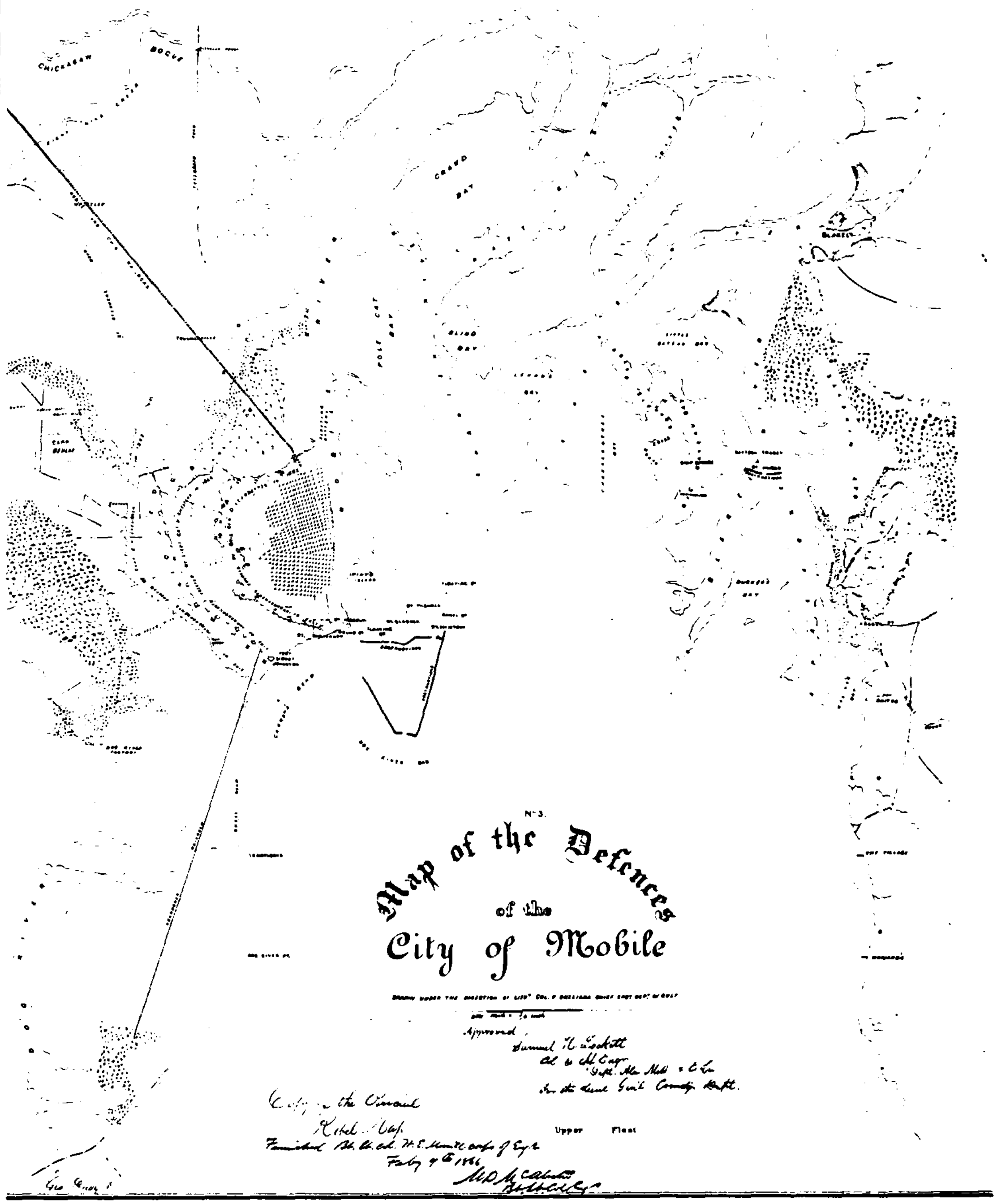


Figure 2

MAP OF THE DEFENSES OF THE CITY OF MOBILE

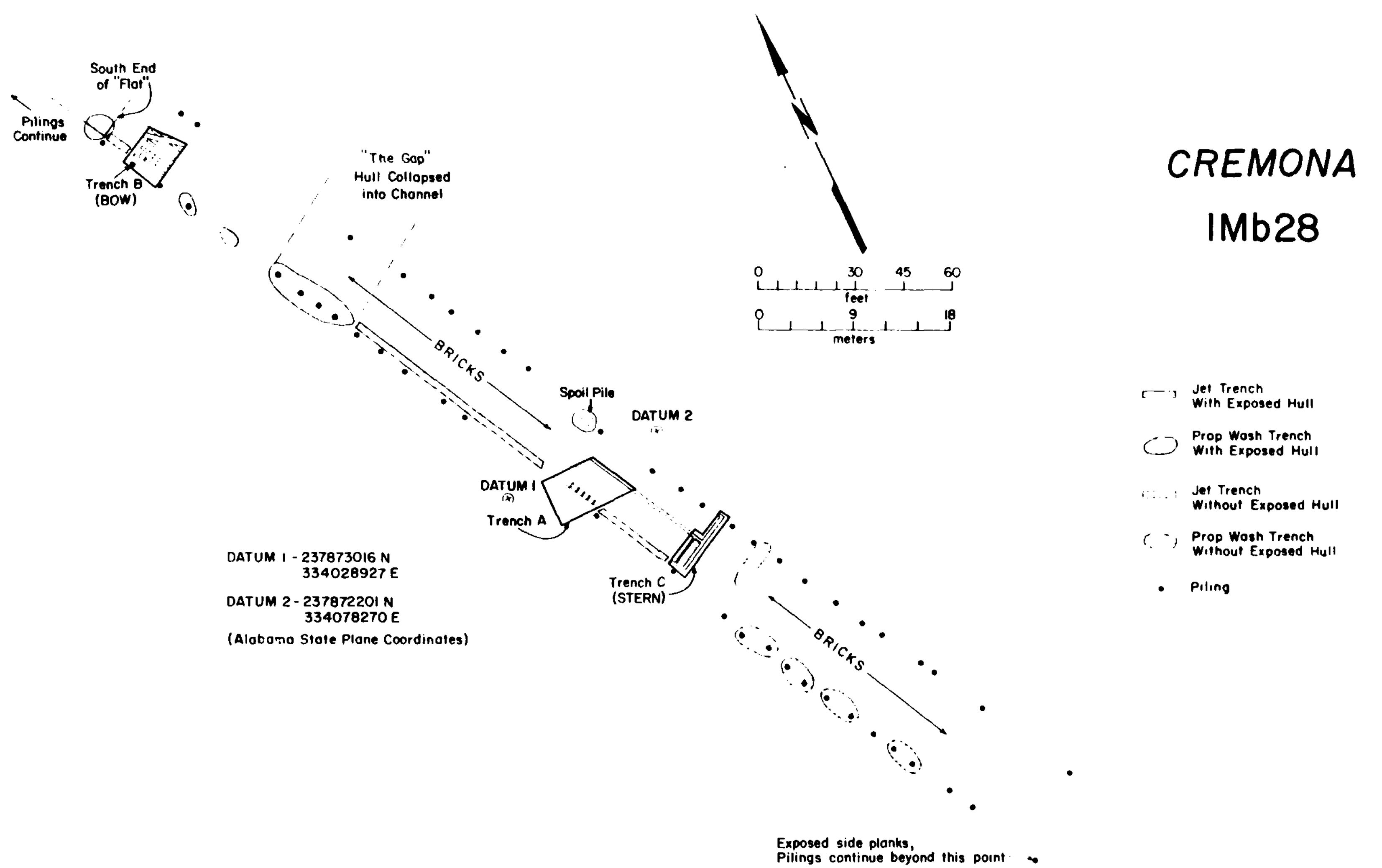
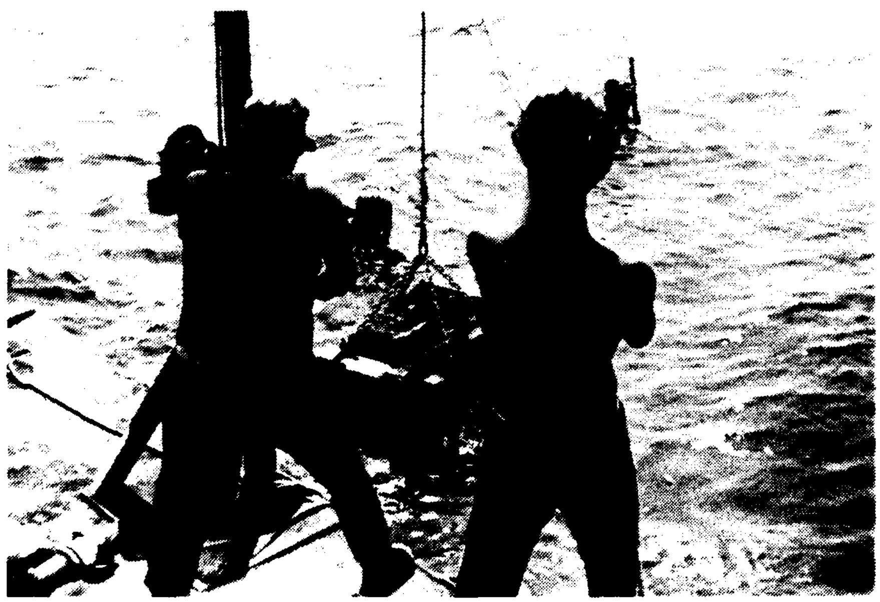


Figure 9 - SITE MAP

A crew member monitors the Geometrics 866 Magnetometer to locate anomalous areas within the site.

Figure 10
MAGNETIC SURVEY OF IMb28

"A" Crew Members Preparing the Prop Wash for operation



"B" Hoisting Excavated Bricks to the surface

Figure 11

TECHNIQUES OF EXCAVATION

When the silt was cleared away, the divers reported finding the upper edge of a planking strake on the west side of the trench. The interior of the hull (east of the strake) was filled with jumbled bricks while the exterior of the hull was supported by pilings. Bricks had spilled to the outside of the hull, making the upper edge of the planking strake the only visible hull member. It was immediately established that the hull was oriented slightly west of north (340°) and that the exposed timber was in an excellent state of preservation.

The barge was positioned so that a rotating steel davit, carrying a bucket constructed of one half of a 55 gallon (209 l) drum, could be swung out over the trench. In this way the bucket could be lowered into the trench where it was filled with bricks by the divers (Fig. 11B). Once filled, the divers gave the signal for the bucket to be winched to the surface by the barge crew who would then empty the bricks onto the deck of the barge and return the bucket to the divers. The bricks were examined for markings or other significant features and then were either saved or tossed over the side onto a spoils heap. Following this procedure, the archaeologists were able to excavate through 4 ft (1.2 m) of brick rubble down to the interior of the hull.

Because of the high sedimentation rate, it was a constant battle to keep the trench from refilling with silt which hampered the removal of the brick. It was found that if one diver played a water jet across the surface of the bricks, keeping them free of silt and clay, the other two divers of the three-member dive team could rapidly load bricks into the bucket. As many as 18 bucket loads of bricks could be removed in a single day.

When the divers began to reach the bottom planking of the vessel, it was necessary to remove the remaining sediment and small brick fragments with an induction dredge. A 3-inch (7.6 cm) dredge head was attached to a WA30 Honda water pump. The excavated material was exhausted through a 10-ft (3 m) length of rigid flex hose attached to a 10-ft (3 m) section of PVC pipe. In this way, the effluent was kept well away from the excavated unit. A diver was always stationed at the discharge end of the dredge to recover any excavated artifacts. Because of the abysmal visibility in the work area, the majority of the smaller artifacts were collected from the dredge exhaust rather than the open trench.

The trench (A) was excavated to a width of 13.2 ft (4 m) on the north-south axis and extended from 1 ft (0.3 m) outside of the hull to the keelson, a distance of 10 ft (3 m) from the side. The brick deposit was 4 ft (1.2 m) deep and was covered by 1.5 ft (0.4 m) of clayey silt sediment. Over 800 cubic ft (19.2 m^3) of material was removed from the unit in 10 work days.

The location of the remaining two excavation units (Trench B and Trench C) proved to be a challenging task. At the outset of the excavation, it had been determined, through the use of steel probes, that the brick mound was primarily confined within a double row of wooden pilings which ran for hundreds of feet throughout the project area. While probing between the rows of pilings, it was also determined that the brick mound was not a continuous level surface, but contained several apparent gaps about 30 ft (9 m) wide (Fig. 12).

Two of these gaps were located approximately 200 ft (61 m) apart, both north and south of the coordinates for TB-4-3. It was these gaps which had originally led to the hypothesis that there was one ship at TB-4-3 filled with bricks, which would be easily distinguishable from the other ships in the line of obstructions (Irion and Bond 1984:40).

Excavation into the northernmost gap quickly demonstrated that the two ends of the ship would not be so easily located. The gaps did not indicate a complete absence of vessel or bricks, but rather were dips in the level of the brick surface. Whereas the majority of the mound was covered only by 1 to 1.5 ft (.3 to .4 m) of clayey silt, the bricks at the gap were covered by as much as 6 ft (1.8 m) of clayey silt. It appears that the hull has collapsed into a relic channel and has spilled its cargo of bricks into and across the channel. The hull is badly broken at this location and the heavy side timbers were found collapsed into the small channel as well. A formal excavation unit was not established in this sector since the Scope of Work called for trenches to be located at the bow and stern. Only enough of the sediment was removed (by means of a prop wash deflector and water jet) to determine that the hull continued beyond the "gap".

As the gap was proven not to be the end of the vessel, another course of action evolved. A decision was made to follow the hull from a known point as identified at Trench A, until it either no longer existed or the bow or stern structure was recognized.

Because both the water and sediment were significantly shallower to the north of Trench A, that area was examined first. Beginning at Trench A, a narrow trench was cut northwards through the sediment using a water jet. The jet only temporarily exposed the top edge of the uppermost extant planking strake, allowing the jet operator to run his hand down the planking strake and follow the line of the hull. Although working in total darkness because of the increased amount of silt injected into the water by the jet, the divers were able to determine that the hull continued unbroken from Trench A to the prop wash hole at the "gap". Further, for much of the length of the jet trench, a third planking strake, missing in our first excavation, was present.

To the north of the gap, the hull was more deeply buried, to the point that the jet was no longer capable of removing the sediment

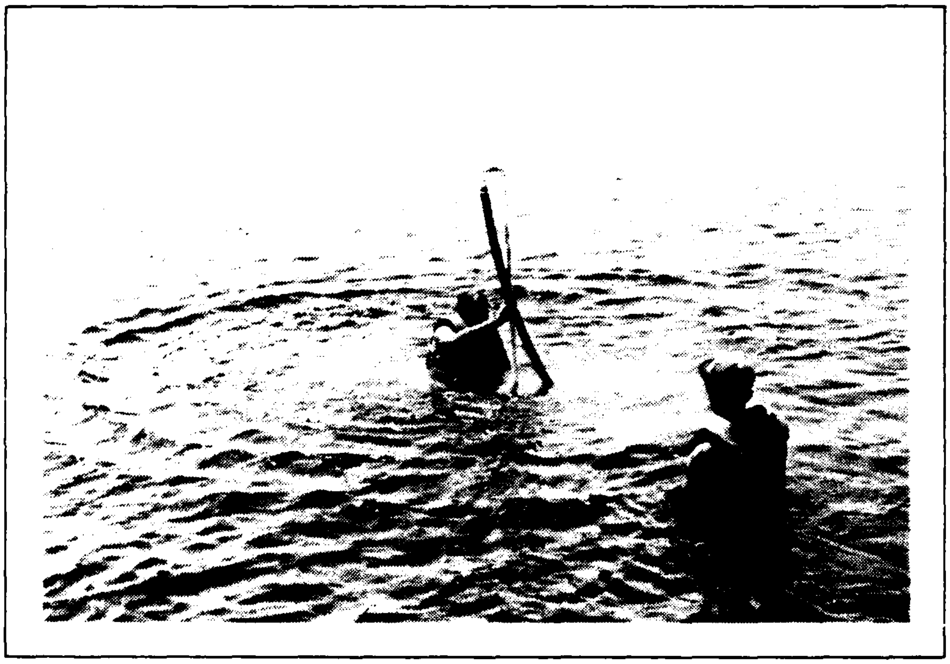


Figure 12

DELINEATING THE SITE
WITH A HYDRAULIC PROBE.

over the planking edge. In order to expedite the search, the prop wash was again employed.

Since it had been determined that the hull closely abutted the row of pilings, these became the focus of prop wash test trenches (Fig. 13). Eventually, at a distance of 162 ft (49.3 m) from Trench A, an upcurved timber was found which signalled the end of the search for the elusive bow.

Trench B, a 10 ft by 10 ft (3 m x 3 m) excavation unit, was excavated to expose the structure of the bow. The bow section was covered by almost 5 ft (1.5 m) of overburden, consisting primarily of gray clayey silt, with only a few bricks at the base of the trench.

The identical procedure was followed to locate the stern of the vessel. Again beginning from Trench A, a narrow trench was jetted along what was now known to be the port side of the vessel. The prop wash was employed to clear sediment from an area where the planking abruptly ended. The excavation resulted in the discovery of a massive transom timber lying at a right angle to the side planking. An excavation unit, Trench C, was established to expose the stern construction.

Trench C was excavated to a width of 4 ft (1.2 m) on the north-south axis and 12 ft (3.6 m) on the east-west axis. The hull was exposed from the stern timber to the last floor frame and from the port side to the keelson. In addition, an ancillary trench was excavated eastward along the stern timber to determine the absolute length of this member.

The excavation of Trench C again required the removal of bricks. The brick mound was found to be continuous fore and aft across the stern. It is hypothesized that the next ship in the line was very close to the stern of Component A since the bricks and piling continue in an unbroken line for at least 150 ft (45 m) farther south. Although prop washing at each of eight pilings south of Trench C failed to reveal any hull structure, it does not preclude the possibility that a hull exists in this area. The presence of hull planking protruding above the bottom farther to the south was noted during a cursory exploration.

ANALYSIS OF METHODS

The methods employed by EH&A archaeologists in the excavation of Component A were considered, by and large, to be successful in the accomplishment of the desired task. Because of the unique conditions of a low water column and near zero visibility, there was a good deal of trial and error involved in the perfection of the most effective techniques of excavation into the hull. The use of a water jet, coupled with manual removal of the bricks, produced the most satisfactory result. Although still painstakingly slow, it accomplished the task

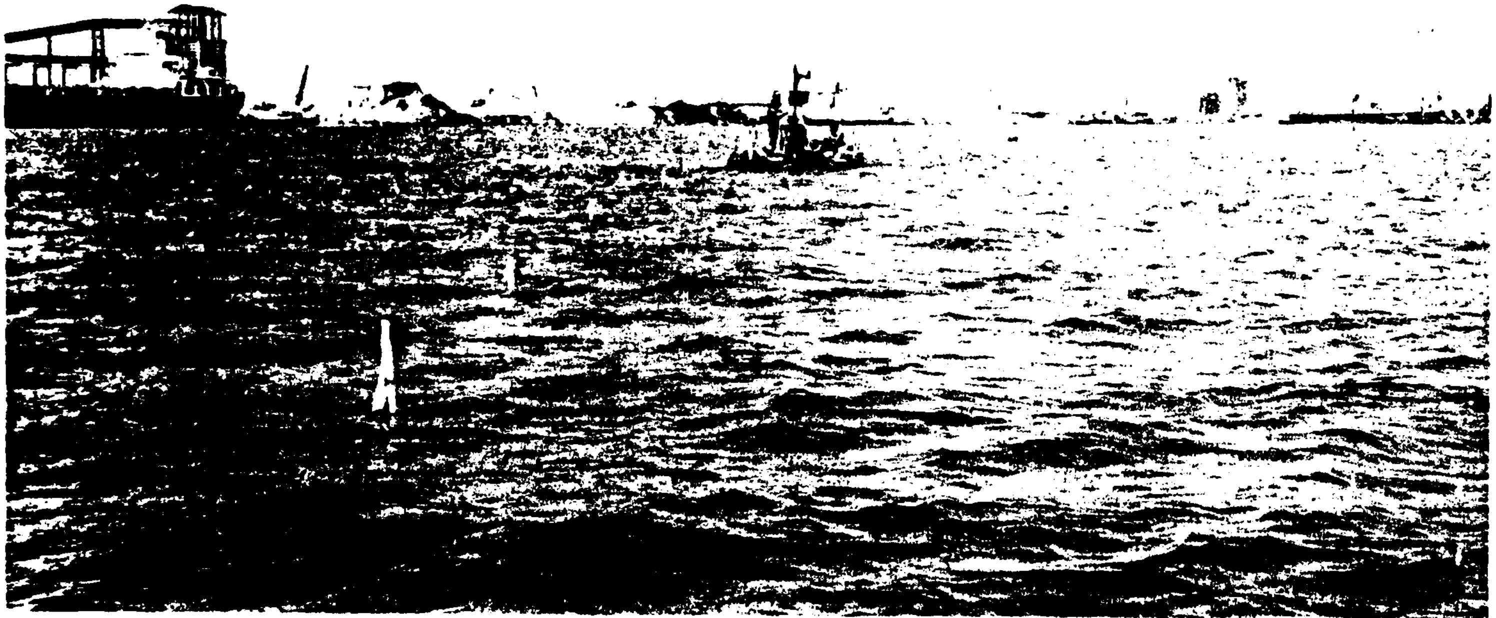


Figure 13

STAKES WERE DRIVEN IN THE BOTTOM BESIDE EVERY OTHER PILING IN ORDER TO DELINEATE THE LINE OF OBSTRUCTIONS

without damage to the hull and permitted an inspection of the bricks for significant markings.

The greatest equipment difficulty was experienced with the prop wash deflector which was employed in the removal of the silt and clay. Because of the depth of the deposit in certain areas, this equipment figured more prominently than was originally anticipated. It was used to clear sediment from the three excavation units and portions of the port side of the hull to locate the bow and stern of the vessel. The depth and instability of the deposit, particularly in this forward, or northern, one-third of the boat, precluded the use of the jet or dredge. Several difficulties were also encountered, however, with the use of a prop wash in such shallow water.

The major difficulties were caused by the necessity of rigging the deflector to an outboard motor which propelled the shallow draft vessel. Rather than being rigidly bolted to the stern of the hull, the deflector had to be attached to the aluminum skeg and cavitation plate of the engine. The vibrations set up by the engine-produced turbulence caused damage both to the deflector and engine. Additionally, the large amount of fine silt sediment introduced into the shallow water column caused frequent blockages of the water intake system and eventual damage to the impeller in the engine cooling system. This was alleviated to some degree by rigging a flush kit and hose attached to an auxiliary water pump mounted off the bow of the boat. This permitted clean water to be pumped to the engine, but was difficult and time consuming to rig and keep in operation. In future, another operation of this type under similar conditions would be well advised to construct a device which was independent of the boat's drive system.

IV. RESULTS OF THE FIELD EXCAVATIONS

CONDITION OF THE HULL

The hull of Component A of 1Mb28 was almost completely preserved up to the waterline, or about 3 ft (0.9 m) up the side of the vessel. The flat bottom of the boat was generally found to be in excellent condition; the timbers remain sound and completely articulated. Surprisingly, even the ceiling planking, laid unfastened across the floor frames, is unbroken by the weight of bricks and mud which have pressed upon it for the past 123 years. If anything, this ballast has served to help protect the hull from infestation by ship worms.

The integrity of the hull has suffered damage in at least two locations: the bow section (Trench B) and the area indicated on the site plan as "the gap". In both instances, the hull seems to have collapsed into a relic river-cut channel in the bay floor. Without its hogging chains to provide longitudinal strengthening, the narrow, lightly constructed hull is susceptible to collapse where it is not evenly supported by the clay bottom.

The investigated port side of the vessel has separated from the bottom of the hull because of the outward force of the bricks and overburden. The integrity of the side is not as well preserved as that of the bottom, but is, nonetheless, in sufficiently good condition to permit the reconstruction of the hull. The disarticulation of the port side has, in fact, promoted the interpretation of the construction by exposing joints which would normally be hidden from view.

The bottom portside strake was preserved throughout the entire length of the craft. The second strake and three futtock frames were preserved in Trench A, while a third strake was identified for a distance of approximately 60 ft (18 m) amidships. The side was missing entirely for the last 4 ft (1.21 m) in the stern, which is perhaps indicative of an exceptional weakness in the hull at this point. The state of preservation of the bow section, which, as previously noted, had collapsed into a channel, was the poorest of any area of the ship investigated by EH&A. The longitudinal timbers were somewhat twisted out of alignment and the bottom planking was missing past the beginning of the upward sweep of the timbers. The forward-raked terminals of the longitudinal timbers exhibited erosion and decay uncharacteristic of other upper hull members; the lack of brick fill in the bow may account for the poor preservation. Unlike the rest of the boat, these timbers were unprotected by the impenetrable mound of brick and exposed to current and marine organisms.

CONSTRUCTION OF THE HULL

Trench A

Trench A exposed a 12 ft (3.6 m) by 10 ft (3 m) area from 162 ft (49.3 m) to 174 ft (53 m) aft of the bow. This area included the port side to the keelson with five 4-in (10 cm) floor frames, one 11-in (28 cm) floor frame, evidence of six futtock frames, 10 bottom planks, and 13 loose ceiling planks. The port side consisted of two strakes, the first side strake measuring 8 in (20.3 cm) wide and 11 in (28 cm) high, and the second strake measuring 4 in (10 cm) wide and 1 ft (30.4 cm) high (Fig. 14).

The sides of the vessel are constructed in a manner which is atypical of marine construction, although elements of the shipwright's craft are preserved within it. It suggests that the vessel was built by an individual who was trained in the tradition of seaborne ships, but adapted his art to a different set of environmental and economic demands (Fig. 15).

The first side strake is a timber 8 in (20.3 cm) wide and 11 in (28 cm) high. The underside of the timber is notched to receive the half dove-tail which forms the terminal of the floor frames and is rabbeted to receive the bottom planking. A 2 in (5 cm) wide lip on the bottom outside edge of the first side strake was left to protect the ends of the bottom planking. Two of the floor frames had 1.5 in (3.8 cm) thick spacers nailed to the forward side, evidently to correct for a mistake in the alignment of the notches in the side strake. These were first thought to be wedges used to secure the frame to the strake, but the placement of the nail securing the spacer to the frame indicates that it was driven before the side strake was in place. The bottom planking was nailed to the first side strake from underneath with no particular care taken as to the placement of the nails.

Four-in (10 cm) square mortises were cut into the top center of the first side strake at intervals of 2 ft (61 cm) (± 1 in (2.5 cm)) to receive the futtock frames. The futtocks maintained approximately the same spacing intervals as the floor frames but were slightly offset so that the mortise for the futtock did not line up with the notch for the floor frame. The futtocks were secured in their mortises by means of a large iron spike driven from the outside of the hull.

The second strake is edge-joined to the first side strake and nailed to the futtocks from the outside with two iron nails in each futtock. The second strake is rabbeted so that the futtocks fit into the recesses on the inner face of the plank. In this way, the 4 in (10 cm) thick plank fits flush with the 8 in (20 cm) thick lower strake on the outside of the hull, but has a "stepped" appearance on the interior.

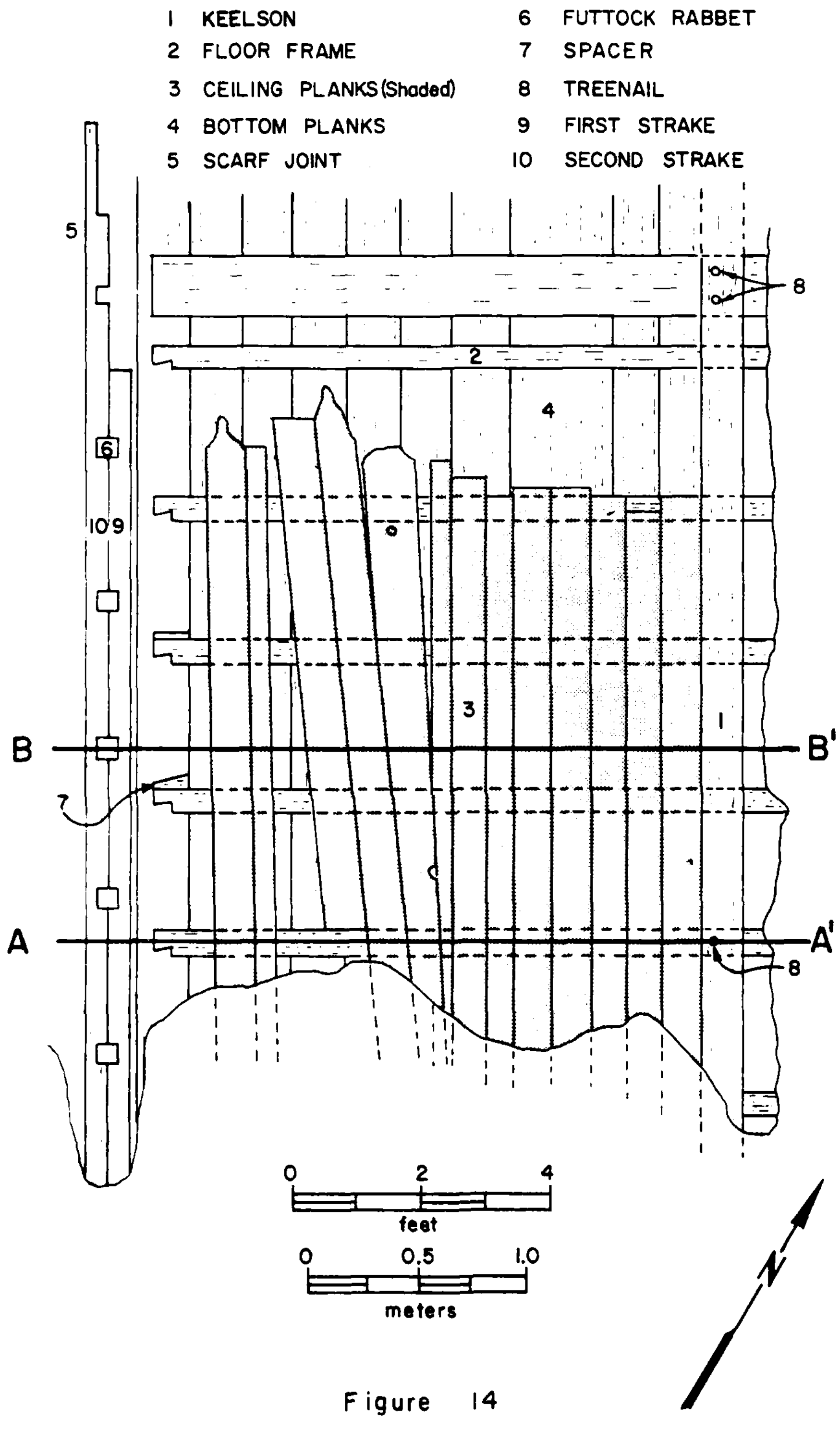
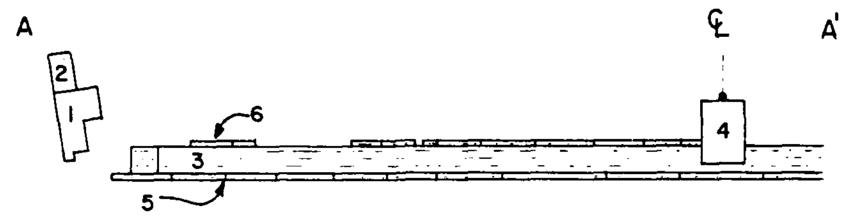


Figure 14

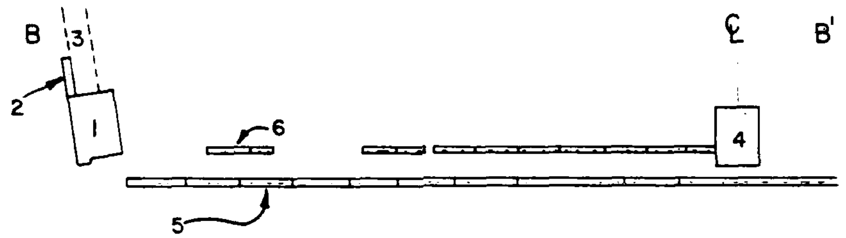
TRENCH A — PLAN VIEW



CROSS-SECTION

A – A'

1 BOTTOM STRAKE, Port Side
2 SECOND STRAKE
3 FLOOR FRAME
4 KEELSON
5 BOTTOM PLANKING
6 CEILING PLANKING



CROSS-SECTION

B – B'

1 BOTTOM STRAKE
2 SECOND STRAKE
3 FUTTOCK, Missing
4 KEELSON
5 BOTTOM PLANKING
6 CEILING PLANKING

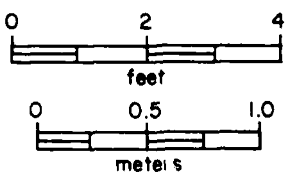


Figure 15

CROSS-SECTIONS OF HULL

Additional strakes do not survive in Trench A, but are present closer to the bow. The third strake, and presumably at least three others in the 6.5 ft (2 m) deep hull, were 2 in (5 cm) thick and fastened to the outside of the futtock. Nothing, however, survives of the upper structure of the hull to indicate how the deck was attached or supported. Additionally, there is no evidence of stanchions or other support members on the floor frames or keelson.

Traditional shipbuilding techniques are visible in some of the means of joinery and fastening. Aside from the dove-tail joints mentioned for fastening the floor frames to the first side strake, the shipwright also employed scarf joints to connect the ends of the planks within a strake line. A very fine example of the type of scarf employed in the vessel was preserved in Trench A (Fig. 16). The side timbers were broken at the scarf, so that only the aft portion of it survives. This was fortunate in a way, as it permitted the excavators to determine precisely how the intricate joint was cut. The ends of the plank in both the first and second strake are joined to the next plank in each strake by means of an elaborate diagonal scarf which is cut so that the second strake planks overlap for half their thickness over the length of the scarf. A mortise and rabbets are cut to accommodate the floor and futtock frames.

Both nails and wooden pegs or treenails are used in fastening the hull together. Iron nails are used in fastening the bottom planks to the floor frames and side strake. Iron spikes, driven from the top of the plank, hold the scarf joint in the side planks together. Nails are also used to secure the side planks to the futtocks. Treenails are employed to fasten the keelson to the floor frames and are also used to join the ends of the scarf.

Trench B

Trench B was excavated in the bow section of the vessel. The bow is of the "scow" type, meaning that there is no modeling or reduction in width of the hull, as in typical ship construction. The scow bow is, instead, an inclination from the horizontal of the plane of the bottom, giving the vessel an appearance like that of a modern steel barge. As explained earlier, the bow is badly broken and in a collapsed state which complicates its interpretation (Fig. 17).

The first side strake is reduced in width from 8 in (20 cm) to 6 in (15 cm). The timber also tapers in thickness down to 6 in (15 cm) at its terminal. The slightly curved timber terminates with an interior rabbet cut through half of its width. A treenail hole running horizontally through the notch indicates that another timber was attached here, perhaps the gunwale, as the rake of the hull does not seem to extend beyond this point.

The Cremona is a perfect representative of the type of vessel which formed the majority of the fleet of packets plying the western rivers. In Foster's words, she was "as substantial and economical a boat as ever turned a wheel". (Foster 1960:42). She belonged to the last great era of American river packets, when vessels were built for economy, efficiency and speed. They were "no-nonsense" vessels, lacking the elaborate gingerbread decoration that characterized steamboats of the 1830s and 1840s which helped make cotton king in the south and supplied in return the requirements of civilization: dry goods, groceries, hardware and whiskey.

THE NEW ALBANY SHIPYARDS

The yard which produced the Cremona was but one of many such enterprises which made New Albany one of the major producers of steamboats in the 1840s and 1850s. Its prominence was primarily due to its geographic location at a key point in the western rivers network. The limitations of the Louisville and Portland canal, which dictated that no steamboat over 182 ft (55m) could pass through its locks, made it the custom to build larger boats below The Falls on the Ohio. New Albany was the most important boatbuilding center below The Falls (Bogle 1951:110).

By the late 1840s, boatbuilding in New Albany had become specialized into three separate phases. These phases were remarked upon by Baron de Gerstner, who visited the area in 1840:

> "Generally, the hull of the vessel is built by ship carpenters, the steam engine delivered from a manufactory and put on the boat, after which the joiners build the cabins." (Morrison 1958:229).

As previously mentioned, the Cremona's hull was built by John Evans, her cabin by Hart and Stoy, and her engines by Lent, South and Shipman. Other subcontractors were responsible for the carpets and upholstery.

As many as twenty boats per year were built by New Albany builders (Bogle 1951:112). Every available shipwright was employed and, on some boats, gangs worked at night by torchlight (Merrick 1909:161). Hulls could be completed in as little as six weeks with gangs of shipwrights, carpenters, and laborers numbering as large as 75 (Bogle 1951:113).

There are, unfortunately, almost no preserved records of the boatbuilding industry in New Albany and virtually no plans of the vessels (Eskew 1929:224). Practically the only information which survives on the Cremona's builder, John Evans, is that he was in the boatbuilding

V. THE LIFE AND TIMES OF THE STEAMBOAT CREMONA

INTRODUCTION

When the Cremona lay in the ways in a shipyard in New Albany, Indiana, American river steamboating was at its apogee. The steamboat was no longer the curiosity it had been just three decades before, but a regular means of transport upon which the peoples of an expanding nation relied for commerce with the outside world. By 1856, there were 800 steamboats in constant operation on the Ohio and Mississippi rivers and their tributaries (Morrison 1958:208). Steamboating in Alabama had also shown a marked increase since 1850, due, ironically, to the railroads which connected northern Alabama with adjoining states (Frazer 1907:24). These same railroads eventually spelled doom for the steamboat after the Civil War.

The largest shipyards producing steamboats were at Louisville, New Albany, Pittsburg and St. Louis (Morrison 1958:226). From 1849 to 1862, the Ohio Valley shipyards produced nine out of ten of the steamboats navigating the western rivers (Merrick 1909:161). Steamboat production in this area was so great, in fact, that the Ohio Valley led the world in shipping tonnage constructed (Hulbert 1906:334). The Cremona, then, serves as an excellent example of the typical 1850s steamboat plying the Alabama rivers.

Launched on October 21, 1852, the Cremona was exceptionally long-lived for a river steamboat; the average life of such a vessel was usually only five years (Merrick 1909:83). The Cremona, on the other hand, saw constant service for 10 years until 1862, when she was sold for $1000 to the Confederate Corps of Engineers to be used in the Dog River Bar obstructions at Mobile (National Archives 1973).

Like most of the steamboats built on the Ohio River, the Cremona was made to order and several different firms had a hand in her construction. According to a newspaper article published at the time of her launching, the hull was built by John Evans; the cabin by Hart and Stoy; the machinery by Lent, South and Shipman, and the upholstery by Mr. Devinney (New Albany Daily Ledger 1852:3).

The Cremona's first owner and captain was A.H. Johnson, who, according to the reminiscences of James Foster, was a great lover of the violin (Foster 1960:42). Foster recounts the story that, on Johnson's way west to have the then-unnamed Cremona constructed, he was an interested listener to a violin being played in the cabin of a Mississippi steamer and inquired from where the instrument came. Upon being informed that it was made in Cremona (Italy), he resolved to call his new vessel by that name (Foster 1960:42).

because they were generally broken up and sold for lumber upon reaching their destination, with their owner then buying passage back upstream on a steam packet.

CONSTRUCTION OF THE CARONDELET, COMPONENT C, 1Mb28

The ship to the south of Component A, believed to be the Carondelet, was not formally tested by EH&A although a bottom search and probe survey was conducted. This revealed a continuation of the brick deposit and evidence of hull remains over 100 ft south of Cremona's stern. Based on Merrill's map of the area, this vessel is presumed to be the Carondelet. Although formal testing was not conducted on this site under the present contract, some statements, based on historical research, may be made regarding the Carondelet's construction.

The Carondelet was one of three vessels owned by Cox, Brainard and Co. for use in the Mobile-to-New Orleans trade. The other two vessels were the William Bagley, later employed by the Confederate Corps of Engineers (Irion and Bond 1984:108), and the Henry Lewis (Foster 1960:1). All these vessels were large, powerful side-wheelers capable of running in the open Gulf when Grant's Pass was too shallow to navigate.

The marine list of the Mobile Daily Register provides an insight into the kinds of cargo brought into Mobile aboard the Carondelet, goods and supplies which would eventually be carried by steam packets to the planters in the interior. The November 22, 1859 issue lists the Carondelet as having arrived from New Orleans with the following goods:

> "4 bales India bagging, 50 bales hay, 5 bales gunney bags, 44 hogs heads 2 barrels sugar, 9 hogs heads bacon, 6 bags rice, 266 coils rope, 1 crate cabbage, 458 sacks coffee, 50 sacks corn, 3 sacks feathers, 50 sacks oats, 2 barrels varnish, 2 barrels oil, 128 barrels 81 half barrels molasses, 35 barrels potatoes, 19 barrels onions, 3 barrels oranges, 31 barrels apples, 1 barrel crackers, 257 barrels whiskey, 49 barrels pork, 122 barrels flour, 5 barrels 1 ton 20 kegs lard, 15 empty barrels, 30 bundles sheet iron, 12 kegs 5 firkins butter, 3 boxes oysters, 1 box starch, 1 box codfish, 11 boxes cheese, 10 boxes candles, 6 bales hides, 1 package segars [sic] and sundries.

The Carondelet was a deeper draft vessel than the river packets, judging from its ability to sail the outer course to New Orleans. It possibly resembled the low-pressure steamer Cuba (cover) which belonged to a line of splendid mail steamers known as the New Orleans and Mobile Daily Line.

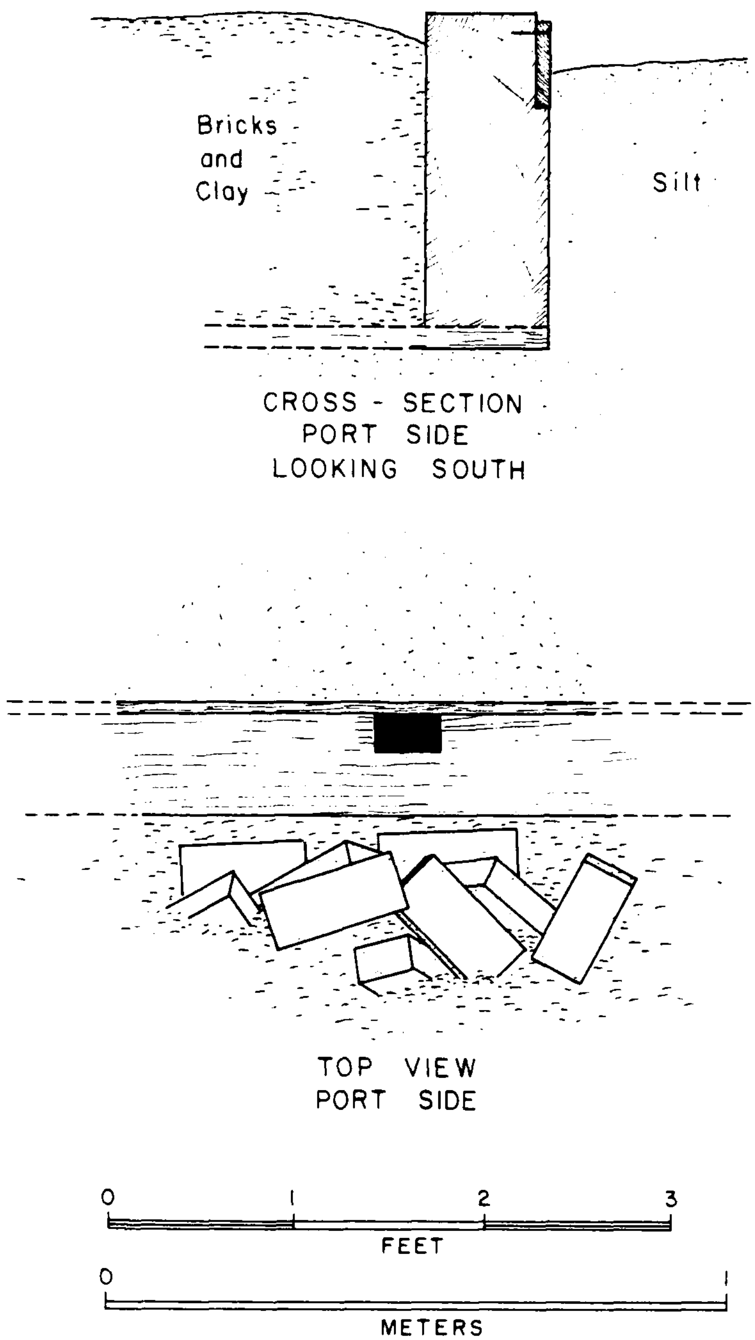


Figure 22
The "Flat" - Component B - IMb28

is indicated on Merrill's map. In addition, the other two possibilities are far smaller vessels, flats generally measuring less than 60 ft (18 m) long and the Carondelet, measuring 160 ft (48.7 m). The Carondelet is also ruled out on the basis of its construction. This vessel is known to have been a strongly built side-wheeler, used in the New Orleans-to-Mobile trade, which was capable of sailing in the open Gulf (Foster 1960:1). The construction of Component A argues against its identification as anything other than a low-water stern-wheel packet.

CONSTRUCTION OF THE FLAT, COMPONENT B, 1Mb28

During the course of excavation to locate the bow of the Cremona (Component A), another craft of different construction was located 10 ft (3m) north of the Cremona. A brief examination of this vessel was conducted to determine its typology and to ascertain if it could be used to substantiate the accuracy of Merrill's map showing the alignment of the vessels in the Dog River Bar obstruction.

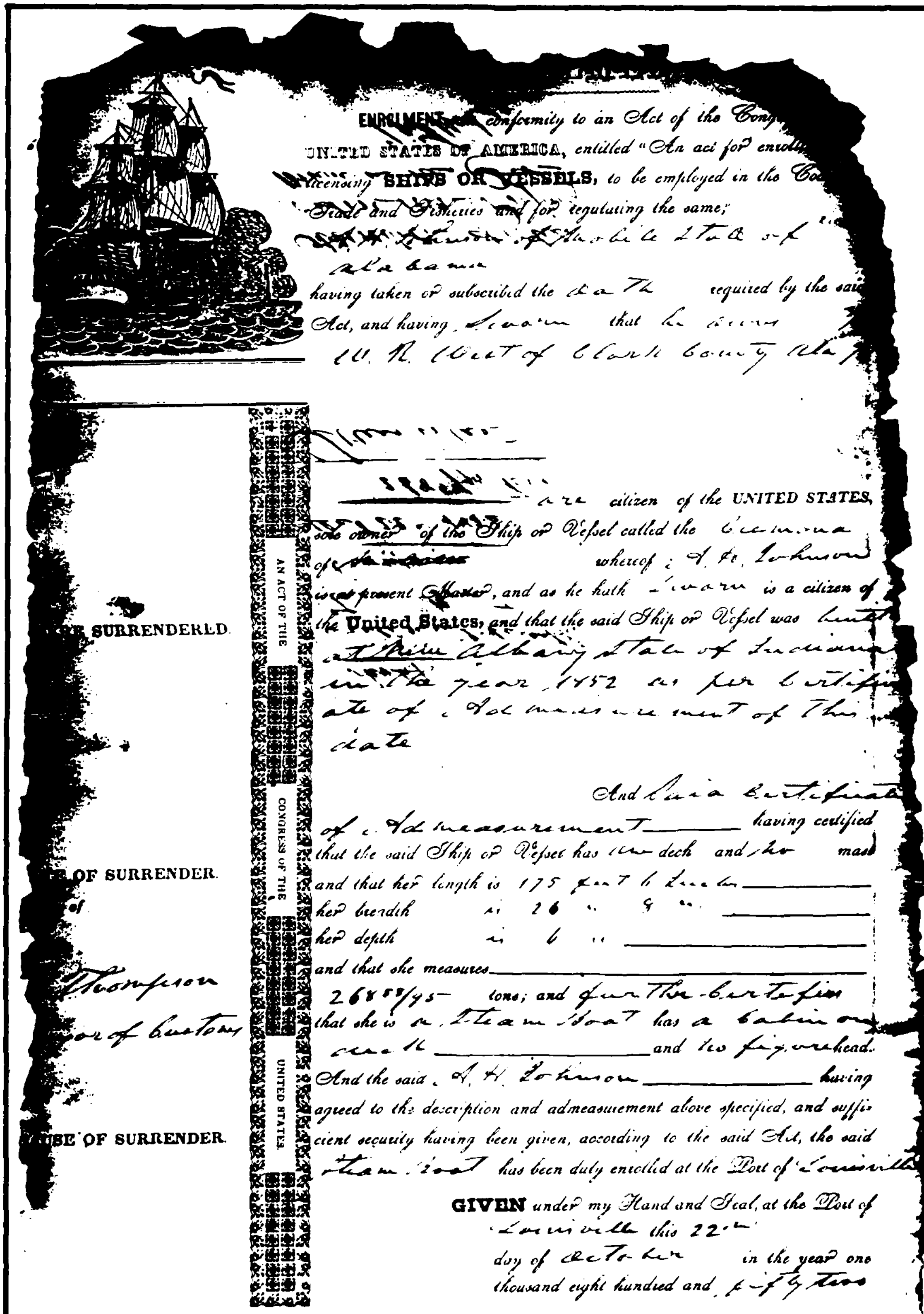
This vessel, like Component A, was filled with brick which was piled 2.5 ft (70 cm) to 3 ft (90 cm) deep in the hull. Only the bottom planking and first side strake or "sill" survive. The sill is 6 in (15 cm) thick and 21 in (53 cm) high. The upper edge of the outer face of the sill is rabbeted to receive a plank 1 in (2.5 cm) thick and 5 in (12 cm) high which is nailed to the sill, leaving a .25 in (6 mm) lip at the upper edge. The bottom planking is nailed flush to the sill and is 1.5 in (4 cm) thick (Fig. 22).

This type of construction closely parallels Baldwin's description of flatboats in The Keelboat Age in Western Waters (1941):

> "The flat was built on sills or gunwales of heavy timbers six inches thick and was strengthened by sleepers. The gunwales were one or two feet high and on top of them were mortised studs, perhaps three inches thick and four to six inches wide. At the top of these studs were the rafters that were to bear the roof." (Baldwin 1941:48).

Flatboats of this type varied in length between 20 and 100 ft (6-30 m) and in width between 12 and 20 ft (3.6-6 m). Burdens varied considerably in size, but the average cargo capacity of flatboats was between 40 and 50 tons (36-45 t) (Baldwin 1941:47).

These river craft were extremely simple and cheap. The best boats were built of oak, but pine, being cheaper, was generally favored. The wood was seldom seasoned and was fastened by treenails rather than iron nails (Baldwin 1941:48). Flatboats were designed to be navigated only in one direction, i.e., downstream. They were cheaply built



ENROLMENT, in conformity to an Act of the Cong
UNITED STATES OF AMERICA, entitled "An act for enroll
licensing SHIPS OR VESSELS, to be employed in the Co
Trade and Fisheries and for regulating the same;"
... of Mobile State of
Alabama
having taken or subscribed the Oath required by the said
Act, and having sworn that he is
W. R. Crist of Clark County ...

... are citizen of the UNITED STATES,
sole owner of the Ship or Vessel called the Cremona
of ... whereof A. H. Johnson
is at present Master, and as he hath sworn is a citizen of
the United States, and that the said Ship or Vessel was built
at New Albany State of Indiana
in the year 1852 as per Certificate of admeasurement of this date

And said Certificate of admeasurement having certified
that the said Ship or Vessel has one deck and no mast
and that her length is 175 feet 6 inches
her breadth is 26 " 9 "
her depth is 6 "
and that she measures
268 58/95 tons; and further certifies that she is a Steam Boat has a cabin on deck and no figurehead.
And the said A. H. Johnson having agreed to the description and admeasurement above specified, and sufficient security having been given, according to the said Act, the said Steam Boat has been duly enrolled at the Port of Louisville

GIVEN under my Hand and Seal, at the Port of Louisville this 22nd day of October in the year one thousand eight hundred and fifty two

SURRENDERED.

OF SURRENDER.

Thompson
...or of Customs

CAUSE OF SURRENDER.

AN ACT OF THE CONGRESS OF THE UNITED STATES.

Figure 21
THE CREMONA'S FEDERAL ENROLLMENT PAPERS

construction 1.75 ft (0.5 m) deep. Theorizing Component A to be the Cremona, another vessel would be expected to the south. A brief survey astern of the Cremona revealed not only that the bricks and pilings continue for nearly another 200 ft (60 m), but that sections of ship's timbers protrude above the sediment inside the western row of pilings.

It might be suggested that, in opposition to the identification of Component A as the Cremona, the dimensions recorded during the excavation do not match those given in other accounts of her. The comparison of these dimensions is as follows:

Source	Length in Feet	Beam in Feet	Tonnage
New Albany Daily Ledger (1852)	182	30	--
National Archives (1852 and 1854)	175	26	268
Lytle (1952)	--	--	268
Merrill (1866)	190	--	--
EH&A	215	20	--

These discrepancies may be satisfactorily explained. Considering the length measurement first, three different figures are recorded historically, all of which differ significantly from the EH&A measurement. The present state of the hull is such that it has flattened outward and disarticulated at several breaks. The extant remains, therefore, measure longer than the historic ship measured when intact. Of the three historic figures, the lowest is that given by the Federal enrollment papers (National Archives, 1852 and 1854) (Fig. 21). These dimensions, however, do not reflect outside measurements of the hull (Bates 1968:22). The 190-ft length quoted by Merrill is probably closer to the actual dimensions.

The discrepancy in the beam measurement may be accounted for by the fact that EH&A's measurement reflects the width of the bottom of the hull, not the true beam or maximum width at deck level. By adding the missing upper strakes and taking into account the width of the guard which was probably removed prior to her sinking, this vessel could easily achieve a beam of 30 ft (9.1 m) at deck level.

The description of the Cremona most closely corresponds to the hull tested by EH&A. Unless the accuracy of Merrill's map is called into question, and there is no reason that it should be, given his access to original sources and eyewitnesses, the Cremona is the only logical identification. EH&A archaeologists located vessels both north and south of the vessel identified as Component A; the hull construction of the northern vessel (Component B) corresponds to that of the flat such as

The other two sockets are port and starboard of the large socket and are 2 ft (61 cm) from it, center to center. These mortises are 4 in (10 cm) long and 2.5 in (6.3 cm) wide. The aft edges of the small mortises align with the aft edge of the large mortise. The mortises were cut using a 1 in (2.5 cm) diameter drill bit and a chisel. The drill holes are preserved on the bottom of the sockets. It is suggested that stanchions, to which the exterior stern planks were fastened, were fitted into these mortises.

The keelson terminates at the transom timber. It is reduced in thickness, thus increasing the height at which it is carried over the bottom planks by the 8-in (20 cm) high floor frames. In Trench A, the keelson is 8 in (20 cm) wide, 11 in (28 cm) thick, and is carried 2 in (5 cm) above the bottom planks. In the stern, the keelson is still 8 in (20 cm) wide, but is reduced in thickness to 4 in (10 cm) and is carried 6 in (15 cm) over the bottom planks. There was no evidence of ceiling planking in the stern.

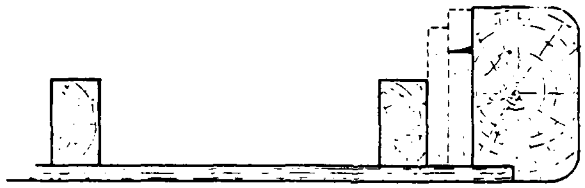
The exterior of the transom was carefully examined for evidence of the steering mechanism of the ship, but none was found; nor was there any evidence of the paddlewheel assembly which drove the vessel. It is theorized that both of these assemblies were removed prior to her sinking.

IDENTIFICATION OF COMPONENT A, 1Mb28

The hull at Component A, 1Mb28, has been identified as that of the Cremona, a river steamboat purchased by the Confederate Engineers on May 15, 1862 to be sunk as an obstruction (National Archives 1973; Irion and Bond 1984:89). According to a newspaper account at the time of her launching, she was built in 1852 in New Albany, Indiana, by John Evans. She was a stern-wheeler of 268 tons (243 t), was 182 ft (55.4 m) long, and had a 30-ft (9.1 m) beam and 6.5-ft (1.9 m) hold (New Albany Daily Ledger 1852) (see Chapter V).

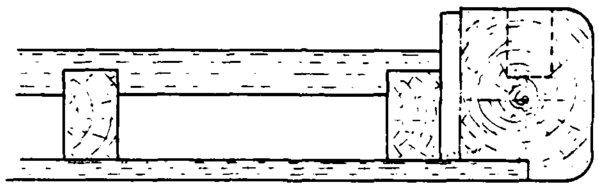
The name of the vessel has largely been determined on the strength of a map of the obstructions made a few months after the end of the war. This map, prepared by Col. W. E. Merrill of the U.S. Corps of Engineers, was one of three accompanying a report to the Chief of Engineers (1866) detailing the condition of Mobile Harbor. It showed three vessels in the western arm of the obstructions: (from north to south) a flat, the Cremona, and the Carondelet. The three vessels were bordered by an open gap to the south and rows of pilings to the north.

During the course of testing the site, a prop wash trench was excavated north of the bow section. The flat described by Merrill was discovered lying only a few feet beyond the bow of the larger vessel and was designated as Component B. It was found to be a simple, box-like



CROSS-SECTION

C–C'



CROSS-SECTION

D–D'

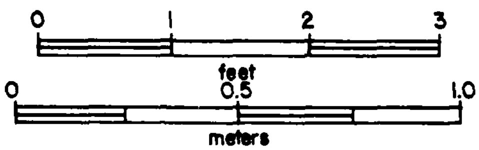
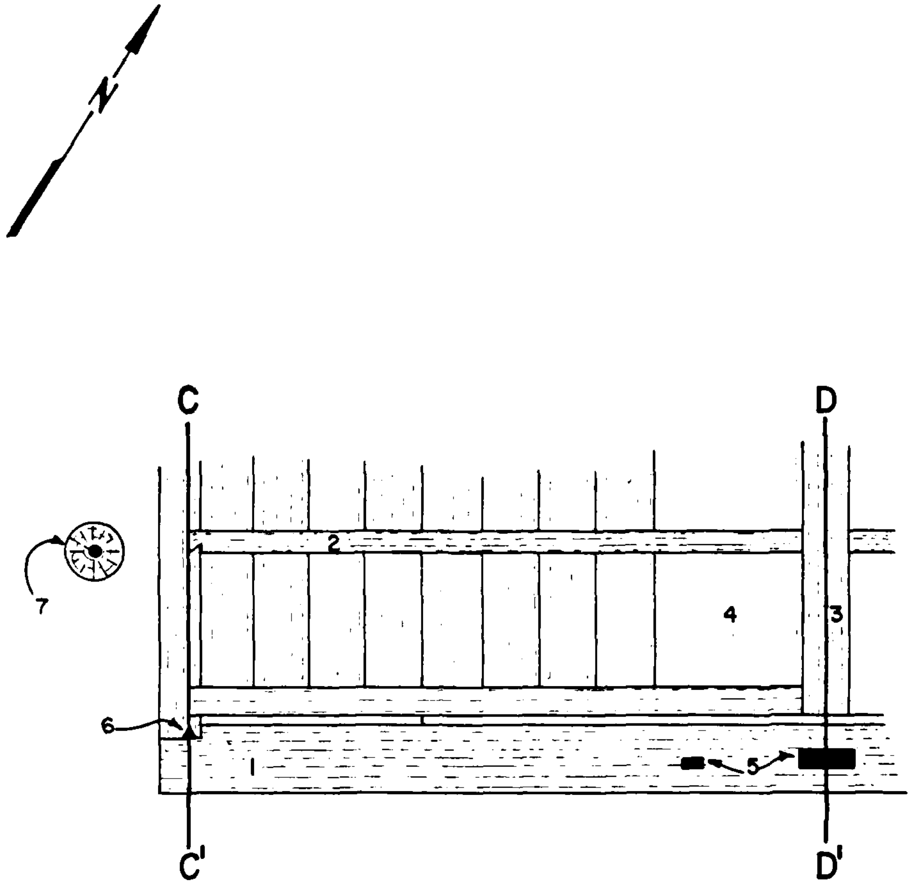


Figure 20

CROSS-SECTIONS OF STERN



1 TRANSOM
2 FLOOR FRAME
3 KEELSON
4 BOTTOM PLANKING
5 SOCKET
6 IRON SPIKE
7 PILING

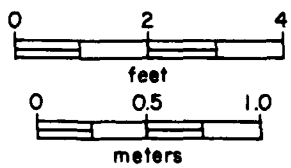


Figure 19

TRENCH C — PLAN VIEW

STERN SECTION (PORT SIDE)

Parallel to the side are the keelson and two intermediate stringers measuring 4 in (10 cm) wide and 9 in (23 cm) high (Fig. 18). These timbers are also slightly curved and terminate in a clean diagonal cut. Because there is no evidence of fasteners or scarfs at the forward end of the timbers, it is presumed that these represent the uppermost sweep of the bow. The first portside stringer was scarfed at its aft end about 5 ft (1.5 m) from its terminal. This timber was removed for conservation and study.

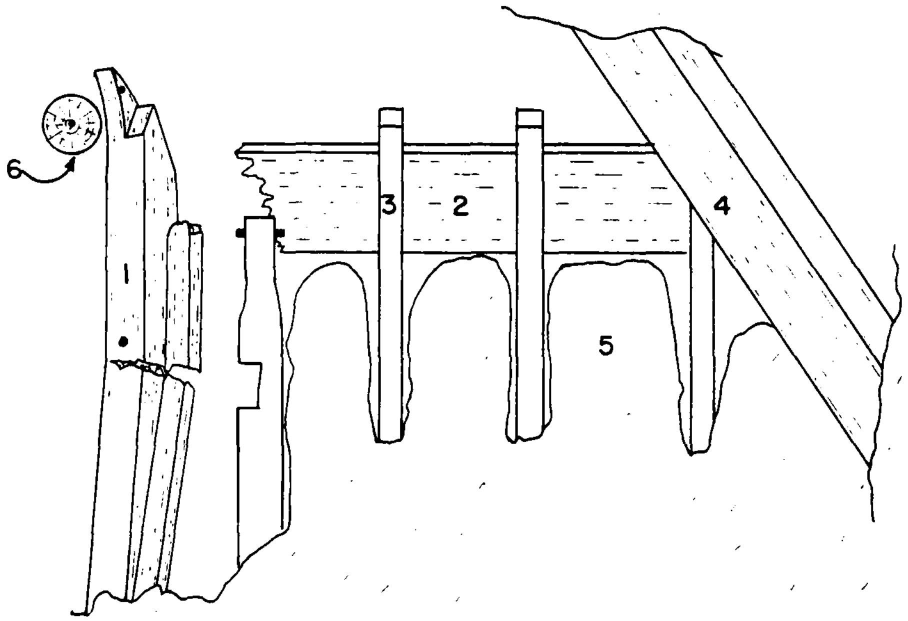
The bow section is planked horizontally, with the planks nailed to the side, stringers and keelson. It is not known at what point in the hull the stringers are articulated to the hull structure described in the previous section. It is hypothesized that these stringers are added for increased strength and rigidity in the hull. They clearly do not extend throughout the length of the hull as they are not present in either Trench A or C. They may terminate aft of the boiler deck where the greatest weight is accumulated.

A 6-ft (1.8 m) length of a heavy timber measuring 1 ft (30 cm) wide by 8 in (20 cm) thick was recorded running diagonally through the unit. This piece was rough-cut, with its sides slightly rounded. The only significant feature on the timber was a notch measuring 8 in (20 cm) wide and 4 in (10 cm) deep. A treenail hole was pierced from the center of the upper surface of the notch to the outer face of the timber. The timber is now disarticulated and it is unclear what function it might have served.

Trench C

Trench C was excavated in the stern section of the vessel. Approximately the last 5 ft (1.5 m) of the hull were exposed to the keelson (Fig. 19). An ancillary trench was excavated along the transom to the starboard side to determine the absolute width of this timber. The stern is flat and rectangular (Fig. 20). Although nothing remains above the heavy timber which forms the lowest strake of the transom, mortises cut into its upper face suggest that there was no rake to the stern. This timber is 1 ft (30 cm) wide, 14 in (36 cm) high and 20 ft 2 in (6.15 m) long. It is rabbetted at the two ends to receive the first side strake, which was held in place by an iron spike driven from the stern. The side strake no longer survives at this point in the hull. It was probably rabbeted to receive the last floor frame, which is separated from the transom timbers by a 5-in (12.7 cm) thick spacer. The next-to-the-last floor frame is dove-tailed like those in Trench A.

The underside of the transom timber is rabbeted to receive the aft ends of the bottom planks. Three 6-in (7.6 cm) deep mortises are cut into the upper face of the transom timber. The largest of these is precisely centered and measures 9 in (23 cm) long and 4 in (10 cm) wide.



1 SIDE TIMBER
2 BOTTOM PLANK
3 STRINGER
4 LARGE UNIDENTIFIED TIMBER, May be unrelated to hull
5 BRICK FILL
6 PILING

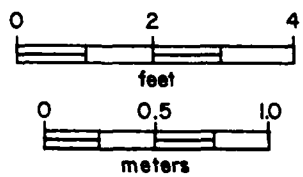


Figure 18

TRENCH B - PLAN VIEW

BOW SECTION

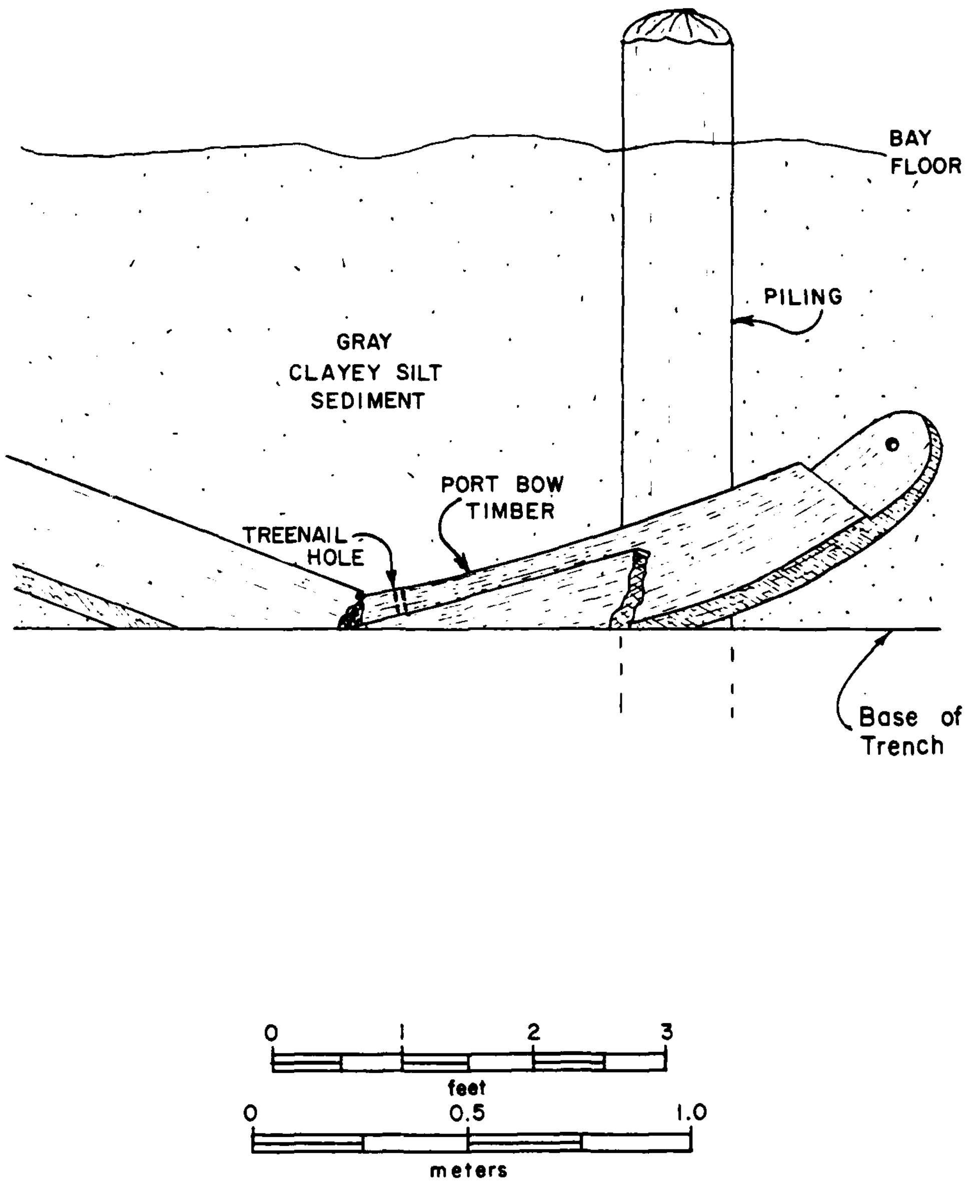
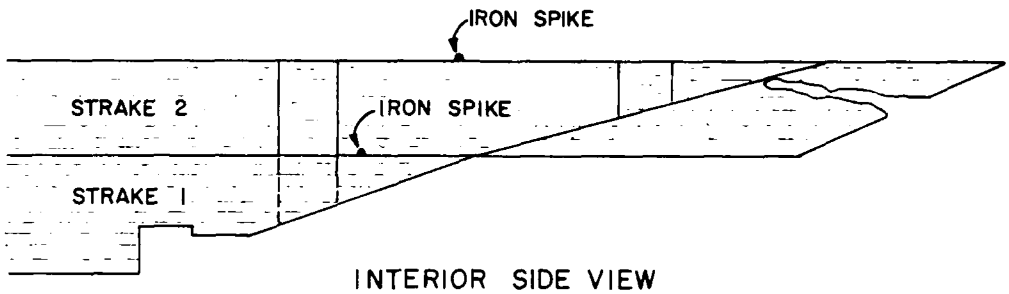


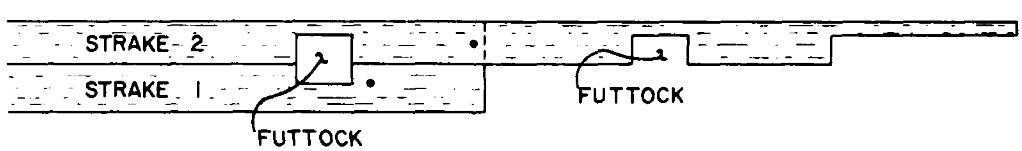
Figure 17

TRENCH B

WEST WALL PROFILE



INTERIOR SIDE VIEW



TOP VIEW

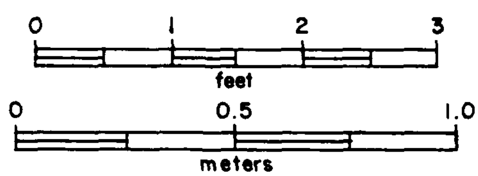


Figure 16

Detail of

TRENCH A — 162 ft. AFT of BOW

SCARF JOINT IN PORT SIDE STRAKES

business at least from 1845 (New Albany City Directory 1845-46). He was best known for another vessel, the A. L. Shotwell, which was built in the same year as the Cremona. The A. L. Shotwell was famed for her speed and was the holder of the New Orleans-to-Louisville running record of four days, 10 hours, 20 minutes (Clemens 1981:89). The race between the A. L. Shotwell and the Eclipse was one of the most famous events in the "flush times" of steamboating. The event was described by Mark Twain in Life on the Mississippi:

> "When the Eclipse and the A.L. Shotwell ran their great race many years ago, it was said that pains were taken to scrape the gilding off the fanciful device which hung between the Eclipse's chimneys, and that for that one trip the captain left off his kid gloves and had his head shaved, but I always doubted these things." (Clemens 1981:17).

The A. L. Shotwell was a much larger and more costly vessel than the Cremona, measuring 310 ft (94 m) x 36 ft (11m) x 8 ft (2.4m) (Way 1983:2). Her tonnage was 1,050 and she cost $85,000, as opposed to the Cremona which had a 290 ton capacity and cost $23,000 (Bogle 1951:453).

The same foundry which produced the Shotwell's powerful engines also supplied those of the Cremona. She was equipped with two cylinders of eight foot (2.4 m) stroke and two boilers 42 inches (1m) in diameter (New Albany Daily Ledger 1852:3). The foundry which produced these engines was the Phoenix Foundry of Lent, South and Shipman.

The Phoenix Foundry, established in 1843, turned out two steamboat engines every month, in addition to land engines, presses, castings, and various other types of iron equipment. In 1855, it employed over 150 men and had a weekly payroll of over $1000. Its gross business was annually more than $200,000 (Bogle 1951:116). Besides the A. L. Shotwell and the Cremona, other noted boats which received Phoenix engines were the Reindeer, Old Empire, H.R.W. Hill, California, Belle Key, Rainbow, Magnolia and the New Uncle Sam.

The decoration of the New Albany boats varied considerably. While some were "plainly finished, but possessing every comfort" (New Albany Daily Ledger 1855), others like the Brilliant described below, were furnished like floating palaces:

> "Every portion of this magnificent cabin is beautifully gilded in gold, which presents a rich and gorgeous appearance... The ladies' cabin is to be furnished with elegant tapestry from Brussels. The cushions are to be covered with finest brocatelle. There are two brides chambers, to be furnished with mahogany bedsteads and most beautifully decorated with

> lace, etc. All the state rooms in both the cabins are large and convenient, and to be furnished with spring matresses. A large mirror is to be placed in the back part of the ladies' cabin, and one on each side of the door in the gentlemen's leading to the ladies' cabin so that when the doors are thrown open, it will look like one immense mirror at the after end of the boat. Aft of the ladies' cabin is a hall for the female servants, and on the second deck their sleeping apartment. There are also special sleeping apartments for the stewards and cabin boys, apart from the cabin. In the "Texas" there are rooms for the officers, and also a card room where those wishing to play can go and thus be separated from the cabin, many passengers not liking to be present where card playing is going on. Separate tables will be spread for the officers and also for the servants, so that the passengers will have the cabin entirely to themselves at all times." (New Albany Daily Ledger 1850).

No record survives of the Cremona's appearance beyond the fact she "is a beautiful boat, and will vie with the many splendid steamers we have sent to the Alabama rivers" (New Albany Daily Ledger 1852:3). One additional scrap of information is found on her original Federal enrollment papers (National Archives 1852) from which it is learned that she had "a cabin on deck". Elsewhere it states that the Cremona had one deck. This in no way means that the Cremona lacked the hurricane and Texas decks which typified steamboats of the period; being a passenger steamer, she almost certainly did. The "one deck" refers instead to a legal definition describing the number of cargo decks, capable of supporting a certain number of casks out of the weather (Bates, personal communication 1985). Since the lower deck of a steamboat was open-sided, this drastically reduced the official tonnage estimate, a circumstance of which steamboat captains took full advantage at tax time! The mention of "a cabin on deck" probably indicates she had a cabin on the main or "boiler" deck.

While the construction and decoration of western steamboats like the Cremona have been much praised, not all observers were impressed. David Stevenson, an English engineer reported:

> "We must not expect to find, however, in that class of vessels (Western steamboats) the same display of good workmanship, and the attainment of the high velocities which characterize the vessels on the eastern waters... but, what is of far more importance, too many of the vessels are decidedly unsafe, and, in addition to this, their management is intrusted to men whose recklessness of human life and property is equalled to only by their ignorance and want of civilization." (Morrison 1958:221).

He further observes that:

> "Economy would indeed seem to be the only object which the constructors of these boats seem to have in view, and, therefore, with the exception of the finery which the cabins generally display, little care is expended in this construction, and much of the workmanship connected with them is of a most superficial and insufficient kind." (Morrison 1958:221).

There is ample evidence in the Cremona's hull that she was rapidly and cheaply built for the time. There were several cost saving features in the hull such as the almost exclusive use of sawn rather than adzed planks and the rectangular, box-like construction which would have vastly simplified the building of the hull. The construction was a function of economy. Steamboats, because of the many snags, rocks and shoals which lay in wait for them, had an average life span of five years, compared to perhaps 50 years for a deepwater vessel. It simply did not make business sense to lavish money on stout hulls which would still not be impervious to snags. Lightness of construction was another factor. It was boasted that steamboats were able to navigate on a heavy dew and, in the shallow waters of many of the rivers, a light draft was an absolute necessity. It was not uncommon, in fact, for a steamboat to literally crawl over a sand bank. Heavy marine construction would have only reduced the functional cargo capacity and rendered the boats less profitable.

THE CREMONA OF MOBILE

The Cremona arrived in Mobile on November 10, 1852, with her new owner, Capt. Andy Johnson. The very next day, the "splendid new passenger steamer" was scheduled to depart for Montgomery (Mobile Daily Register 1852). The Cremona remained on the Mobile-to-Montgomery route until at least 1855. A gap in the record exists between 1855 and 1859, but sometime during that period, she was transferred to the Tombigbee trade, calling at Aberdeen and Columbus.

A contemporary description of the trip from Mobile to Montgomery exists from 1853:

> "I left for Mobile on the steamboat Fashion, a clean and well ordered boat, with polite and obliging officers. We were two and a half days on the trip, the boat stopping at almost every bluff and landing to take on cotton until she had a freight of 1900 bales, which were built up on the guards seven or eight feet in height and until it reached the hurricane deck. The boat was brought so deep that her guards were in the water and the ripple of the river constantly washed over them. There were two hundred landings on the Alabama and three hundred on the Bigbee." (Frazer 1907:25).

The main business of the boats was the transporting of cotton down the rivers to Mobile. The method of loading cotton has also been described:

> "The boat came to the shore at the end of a plank slideway, down which cotton was sent to it from a warehouse at the top. There was something truly Western in the direct, reckless way in which the boat was loaded. A strong gang plank being placed at right angles to the slideway, a bale of cotton was let slide from the top, and, coming down with fearful velocity, on striking the gang plank it would rebound up and out on the boat against a barricade of bales previously arranged to receive it. The moment it struck this barricade, it would be dashed at by two or three men and jerked out of the way, and others would roll it to its place for the voyage, on the tiers aft. The mate standing near the bottom of the slide, as soon as the men had removed one bale to what he thought a safe distance, would shout to those aloft and down would come another. Not infrequently a bale would not strike fairly on its end, and would bound off diagonally overboard; or would be thrown up with such force as to go over the barricade, breaking stanchions and railings, and scattering the passengers on the berth deck. Negro hands were sent to the top of the bank to roll the bales to the slide, and Irishmen were kept below to remove and store them." (Frazer 1907:26)

The marine lists of the <u>Mobile Daily Register</u> occasionally provided information on the cotton brought down to Mobile by the <u>Cremona</u>:

November 17, 1855	per steamboat <u>Magnolia</u>	302 bales
November 20, 1855	from Montgomery	1309 bales
December 5, 1855	from wreck of the <u>Empire</u>	85 bales
February 18, 1859	from Columbus	1289 bales
March 8, 1859	from Aberdeen	719 bales

On the return trip up-river, she would have carried the necessities and luxuries required by the Alabama planters. An example of the kinds of items transported up-river may be found in the cargo list of the <u>Carondelet</u>, one of the steamers bringing goods to Mobile from New Orleans:

> "164 bbls flour, 150 pcs bagging, 100 coils rope, 100 cks bacon, 50 bbls pork, 114 bbls molasses, 3 bbls sugar, 200 bbls whiskey, 10 bbls alcohol, 41 half bbls molasses, 55 sks oats and sundries" (Mobile Daily Register 1859b).

Another cargo manifest lists a "box of segars [sic]" among the imports and 458 sacks of coffee, an extremely important item going up-river (Mobile Daily Register 1859b).

In 1854, the Cremona was sold to Jesse J. Cox who, in partnership with James M. Brainard, Henry L. Jayne, William F. James and A. H. Johnson (the Cremona's first owner), formed Cox, Brainard and Company (National Archives 1854). Johnson carried on as master of the vessel at least through the next year, although he did so under the Cox, Brainard and Co. flag. The Cremona had at least two more masters before the war, Captain Roberts in 1859 and Captain Buckley in 1860.

As a Cox, Brainard and Co. boat, the Cremona continued on the Mobile-to-Montgomery route as part of the U. S. Daily Mail Line. The other boats in the line were all fast passenger steamers: the Messenger, the Magnolia, the Cuba and the Empress. One of the boats left Mobile daily to connect with the arrival of the train in Montgomery (Mobile Daily Register 1855). The rate of freight on these vessels was 50¢ per barrel and $1.00 per bale of cotton.

Nearly all the boats on the river just previous to the war were owned by Cox, Brainard and Co. (Frazer 1907:22), a powerful corporation created by two steamboatmen, Jesse J. Cox, captain of the Messenger, and James M. Brainard, captain of the Baltic. They controlled not only the majority of the river steamers engaged in the Montgomery and Tombigbee trades, but also a fleet of sidewheelers which formed the Mobile-to-New Orleans line. This New Orleans line was comprised of the Carondelet, the Henry Lewis, and the William Bagley, which was converted to a Confederate blockade runner during the war.

Cox, Brainard and Co. also owned a fleet of tug boats which figured prominently during the construction of the Civil War defenses. These were the Swan, the Kate Dale, the Natchez, the Dick Keys, and Brainard's Baltic, which served as an iron- and cotton-clad ram (U. S. Navy Dept. 1971, VI-202). These vessels were capable of going out into the Gulf and frequently carried a cargo of 2000 bales of cotton to vessels in the lower bay (Foster 1960:11).

The fortunes of Cox, Brainard and Co., like the Cremona, were sunk by the Civil War. Several of their vessels, including the Cremona, the Carondelet and the Eclipse, were sunk in the obstructions. Several others were captured or impounded by the Federal government. These included the Baltic, the Dalman and possibly the Dick Keys, among others. Alabama's recovery from the war was slow and the breakdown of the plantation system destroyed the need for the steamboats. As the economy recovered, railroads and river tugboats replaced the packets, carrying goods far cheaper than was possible on the old steamers. The great age of the river steamboat had come and gone in the scant space of thirty years.

TABLE 1

A LIST OF STEAMBOATS IN MOBILE IN 1856
(Lloyd 1856:272)

Name	Where Built	When Built	Tonnage
Wilson	Cincinnati	1851	260
Benj. Lee	"	1852	122
Rescue	"	1854	76
Montgomery	"	1854	315
Champion	"	1853	158
Bloomer	Louisville	1852	70
Pink Toney	"	1852	206
S.S. Prentiss	"	1854	272
Cuba	"	1855	286
Messenger	"	1852	390
P. Dalman	"	1851	365
Swan	"	1850	444
Azile	New Albany	1852	132
Jennie Beale	"	1852	231
Empress	"	1850	304
Eliza Battle	"	1852	316
+Cremona	"	1852	268
Forest Monarch	"	1848	215
Sallie Carson	"	1852	206
Coreo	"	1847	90
Fashion	"	1851	296
Belle Gates	"	1851	278
Lucy Bell	"	1853	170
Isabella	Jeffersonville	1849	249
Aerial	"	1854	169

TABLE 1 (Concluded)

Name	Where Built	When Built	Tonnage
Sallie Spann	"	1852	190
Magnolia	"	1852	326
Octavia	"	1852	185
Emperor	Jefferson	1848	397
W.W. Fry	"	1849	165
Magyar	"	1849	125
J.R. Thompson	New Orleans	1851	160
+Col. Clay	"	1851	296
Natchez	"	1853	388
Cuba	Mobile	1855	42
+Wm. Jones, Jr.	"	1853	391
Emma Watts	Paducah	1851	111
Jeanette	Elizabeth	1855	144
Advance	Thousetown	1853	166
Impire	California	1854	153
Fairfield	Freedom	1854	157
Madison	Memphis	1852	169
Illinois Belle	McKeesport	1854	148
Wild Duck	Biloxi	1850	26
Heroine	Brownsville	1851	94
Col. Freemont	Elizabethtown	1850	75
Clara	Baltimore	1841	94
Junior	Smithland	1852	192
Pratt	Report	1847	293
Canouchet	Providence	1855	147

+ sunk as obstructions - 1862

VI. CONCLUSIONS AND RECOMMENDATIONS

Alabama's historic site 1Mb28 represents a unique resource for the study of nineteenth century American navigation, with three types of indigenous craft present. A flat boat, similar to the type which first carried settlers from the original 13 colonies to the vast lands of the Ohio and Mississippi river valleys, is the northernmost obstruction. A stern-wheel river packet, representative of the romantic, but little studied, period of the antebellum "floating palaces", forms the middle of the line. The third vessel is a side-wheel steamer, heavier built than the riverboat, for sailing "the outer course" between New Orleans and Mobile. These three vessels epitomize the major paths of trade between the South and the outside world: sea, river, and stream.

The two steamboats are representative of the technological achievement of their age. They required the building of machinery capable of developing and transmitting great energy for the purpose of driving boats up and down the Western rivers. As such, they are part of a branch of technology which was still in its embryonic stage and foreign to any previous mechanical experience. Although the engines were removed to further the Confederate war effort, the hulls demonstrate the response of the shipwright to the demands of the new technology and economy. The steamboat hull has been called the most radical departure from traditional naval architecture since John Hawkins' redesigned English warships wreaked havoc on the Spanish Armada's galleons. Their construction, nevertheless, is practically undocumented and the _Cremona_, tested by EH&A under the present contract, represents the earliest archaeologically excavated hull of an American river steamboat. Moreover, its construction was found to be unique in the sense of being non-traditional in terms of marine construction. This factor makes it doubly valuable as a cultural resource.

The hull of the _Cremona_ is flat bottomed, with a scow bow and bluff, square stern. Her beam is 20 ft (6 m) at the bottom and she is 215 ft (65.5 m) long in her present condition. Approximately the lower half of the hull survives and is in an excellent state of preservation. The hull is atypical of marine construction in that the futtock frames are set into mortises in the first side strake.

Because the vessels in the obstructions were intentionally sunk, they were stripped of their engines and upper works. As a result, the major artifacts on the site are the hulls themselves. Because the 1984 testing project satisfactorily explained the methods of hull construction employed in both the _Cremona_ and the flat, no further work has been recommended on these vessels. Additional work is recommended, however, for the southernmost vessel, believed to be the _Carondelet_. A

preliminary investigation in the area has verified the presence of this vessel, but nothing is yet known of its construction, aside from historical inferences.

The excavation of the Carondelet should be pursued along lines similar to the testing of the Cremona. A minimum of three trenches, located at bow, stern, and midships, should be excavated to a width sufficient to permit an interpretation of the method of hull construction and to assess the state of preservation of the vessel. More historical research is also needed on this vessel. Standard secondary works such as the "Lytle List" and Way's Packet Directory (1983) do not allude to the Carondelet. Aside from the few facts mentioned by Foster (1960) and what has been gleaned from contemporary Mobile papers, nothing is known of the vessel or her history.

A number of research questions concerning the obstructions were formulated in EH&A's 1984 report (Irion and Bond 1984:94). These questions were:

1. Does actual construction of the line of pilings agree with the documentary descriptions?

2. Can anomaly TB-4-3 be positively identified as one of the three vessels listed by Merrill in the vicinity?

3. Can the pre-war record be established for the vessel and how does this shed light on Mobile's role in trade and commerce between Alabama and the outside world?

4. What more can be learned regarding the constructional history of the vessel, and how does it apply to the shipbuilding industry and economy of those areas?

5. Where are the other two vessels indicated in Merrill's report for this area, and what is their condition?

6. Precisely where is the line and how much of it is affected by proposed dredging?

7. Does anything remain of the southern line of obstructions and is it in any way affected by the proposed dredging?

8. Does anything remain of the Civil War ironclad Phoenix, sunk in the old channel as an obstruction, and will it be impacted by the proposed dredging?

9. Can the pilings at TB-6-3 be confirmed as the unfinished Choctaw Point Spit Battery?

Most of these questions, at least as they relate to TB-4-3 (Component A), have been satisfactorily answered by the 1984 testing project and accompanying archival research. Additional questions remain for the obstructions to the south and east of the Cremona:

1. Does the construction of the Carondelet agree with Foster's (1960) description?

2. Is there any evidence of the 1871 dredging operation?

3. Does anything remain of the vessel marked by the pre-war wreck stake?

4. How does the Carondelet's construction agree or disagree with the Cremona?

5. Can anything more be learned of the Carondelet's builder and antebellum service record?

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Glass, Ceramic, Brick and Stone

Artifacts of this class suffered remarkably little damage from their 123 year immersion in Mobile Bay. The glass was washed in fresh water and air dried. The other materials were cleaned, stored in fresh water, and finally dehydrated with isopropanol.

Wood

Wood preservation on the vessel is excellent, with little to no loss of cellular structure. Because of this, only minimal treatment is required. The smaller artifacts, such as the barrel staves and corner moulding, were first soaked in acetone to dehydrate the wood and then placed in a pine resin bath. The large stempost, which has absorbed almost no water, required only surface treatment with PEG (polyethylene glycol).

B. Copper and brass - Copper and brass artifacts suffered very little encrustation during their submersion. These artifacts were cleaned with a 10% solution of citric acid, rinsed in fresh water and stored dry.

Ceramics, Glass, Stone and Brick

These materials suffered very little from immersion in bay water. They were cleaned and soaked in fresh water and dehydrated in isopropanol. No deterioration has occurred since their retrieval.

Wood

Most of the wooden artifacts were left in a holding area in the bay in order to change their environment as little as possible until they were to be transported to the conservation lab. Prior to transport, they were washed and packaged in the same manner described for iron artifacts.

Laboratory Conservation

All ferrous and wooden materials were conserved at the Marine Conservation Laboratory at the Institute of Nautical Archaeology, Texas A&M University, College Station, Texas. Other materials which did not require extensive cleaning or treatment were conserved by EH&A personnel in their Austin laboratory. The following techniques were followed for laboratory stabilization of artifacts by material classification.

Ferrous Metals

Very little concretion was present on any of the ferrous artifacts. All but one encrusted spike contained a substantial metal core and consolidated surface. These materials were cleaned using electrolytic reduction. After cleaning, they were coated with tannic acid to give them a pleasing black color and sealed in microcrystalline wax to prevent reoxidation of the restored metal.

The aforementioned spike has corroded to Fe_3O_4 (magnetite) with very little or no metal lift. In this case, the artifact was stabilized by diffusing soluble chlorides in an aqueous solution of sodium sesquicarbonate and consolidated with microcrystalline wax. Prior to the application of the wax sealant, all ferrous artifacts were immersed in isopropanol to dehydrate for a minimum of 24 hours.

Cupreous Metals

Gross encrustations were removed mechanically and remaining residue removed with a 2-15% solution of citric acid. The pieces were then treated with BTA and coated with Akryloid B-72.

APPENDIX II

STABILIZATION OF ARTIFACTS

Materials and Environment

As previously mentioned, comparatively few artifacts were raised during the testing of the Cremona. Of those which were raised, most required very little in the way of chemical or mechanical conservation and could be processed in the field. This fortunate circumstance was largely due to the environment in which they were deposited.

Upper Mobile Bay is largely brackish because of the influx of fresh water flowing from the network of five rivers which feed into the northern part of the bay. These rivers also contribute to the high depositional rate which characterized the area. The combination of the two factors has resulted in the extraordinary preservation of organic materials, such as the hull of the boat. It has also reduced the amount of cleaning and stabilization required for many materials.

The recovered artifacts fall into nine classifications based on material composition. These classifications are: glass, ceramic, bone, wood, brass, copper, iron, stone and brick. Both field and laboratory stabilization methods for each material class are detailed in the following section.

STABILIZATION METHODS

Field Conservation

Stabilization procedures began for all artifacts immediately upon their withdrawal from the marine environment. Field conservation serves both to reduce the chances of further deterioration of the artifacts prior to laboratory stabilization and to lessen the time required to treat the materials in the conservation lab. EH&A instituted the following treatments for each class of artifacts by material:

Metals

A. Iron - Iron artifacts were cleaned of clay and silt and stored in fresh water with a 5% solution of sodium carbonate. During transport to Texas, the artifacts were individually wrapped in burlap, soaked with water and sealed in 5 mil plastic. Upon delivery to the conservation lab at Texas A&M University, the artifacts were placed in a storage tank filled with an alkaline solution of sodium sesquicarbonate with a pH of 9 to 10.

TABLE 2 (Concluded)

CATEGORY	Trench A	Trench B	Trench C
BRASS:			
pin	1		
furniture bolt cover	1		
melted candlestick	1		
COPPER:			
rolled tube	1		
IRON:			
pintle fragment	1		
square plate (9 in x 9 in x 2 in) (23cm x 23cm x 5cm) with circular relief impression on one face			1
strap, 13 in (33cm) long	1		
threaded bolt 1.5 in (3.8cm) dia.,	1		
16 in (40.6cm) long	1		
belaying pin			
spike, 16 in (40.6 cm) long			1
hinge fragments	3		
nails, cut	30		
STONE:			
wheel (grinding stone?)	1		
ballast stone	3		
BRICK:			
M. Bonifay	3		
with incised addition problem	1		
curved firebrick with incuse "G"	1		
curved firebrick with incuse "A"	1		
plain	24		

TABLE 2

ARTIFACT INVENTORY

PROVENIENCE

CATEGORY	Trench A	Trench B	Trench C
GLASS:			
goblet stem, black	1		
wine bottle seals	5		
dark green sherds	106		
light green sherds	11		
aqua sherds	10		
clear sherds	21		
black sherds	2		
amber sherds			1
CERAMIC:			
tile	2		
grey ware, glazed	4		
grey ware, unglazed	2		
salt glazed	3		
white ware	1		
brown crockery	1		1
porcelain	1		
BONE:			
long bone fragments	4		
scapula	1		
WOOD:			
barrel stave	2		
frame fragment	1		
stempost section		1	
moulding, corner	1		

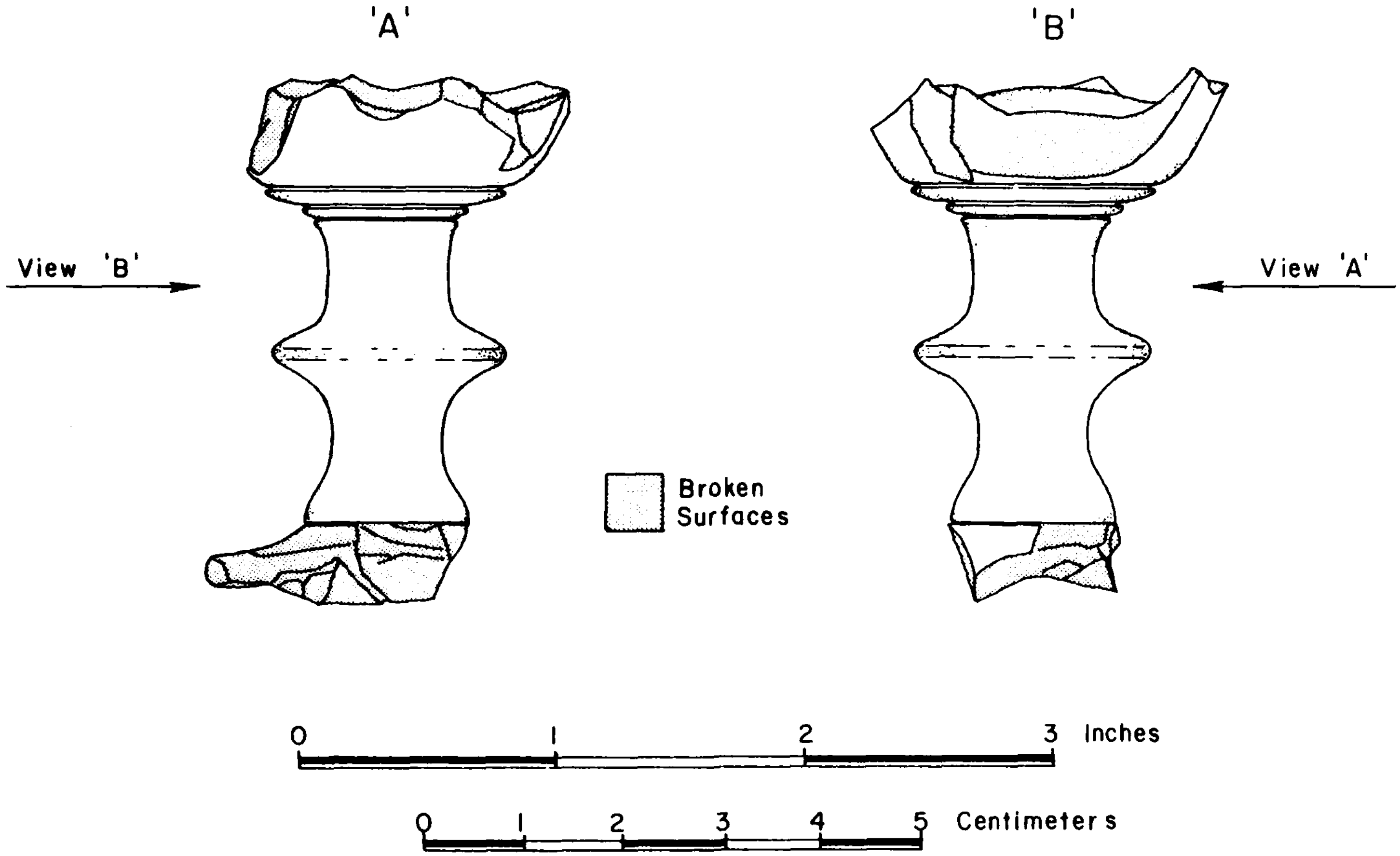


Figure 27

WINE GOBLET STEM

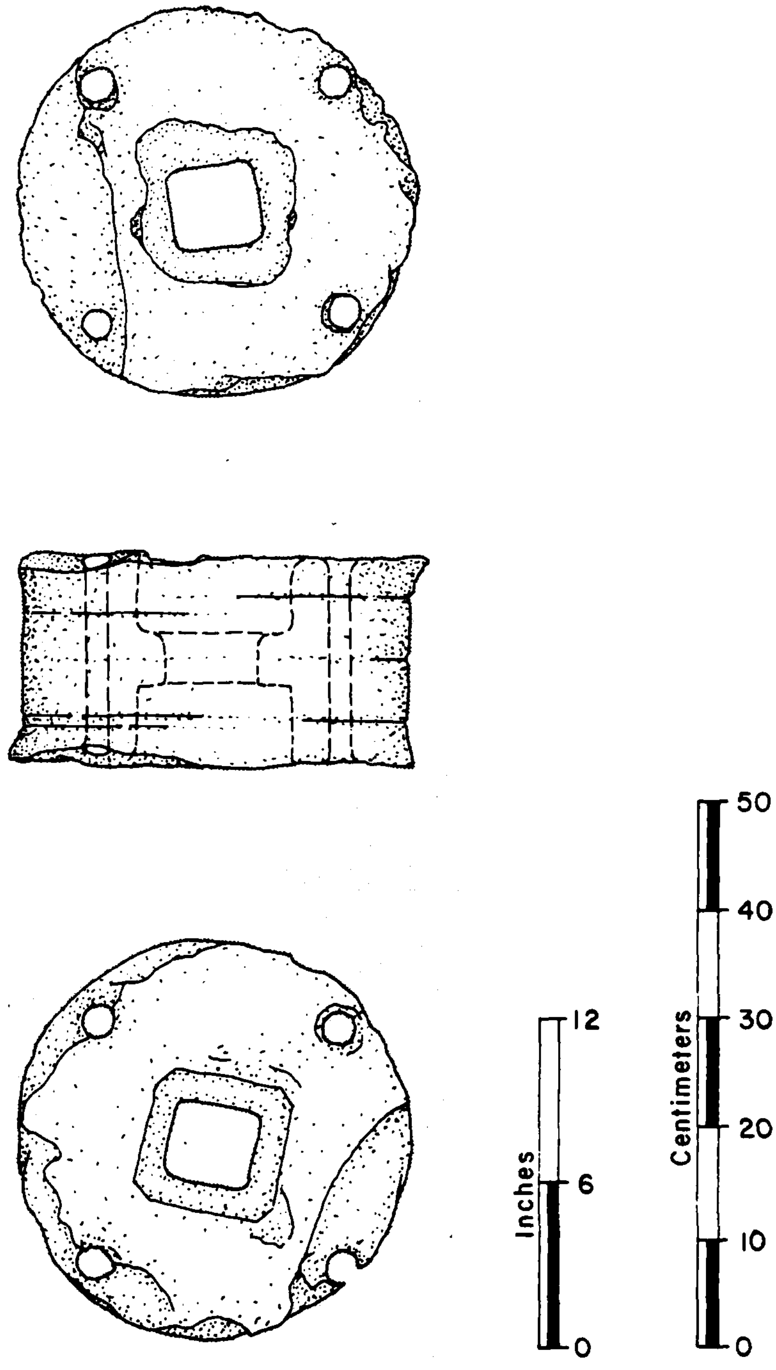


Figure 26
POSSIBLE STONE GRINDING WHEEL

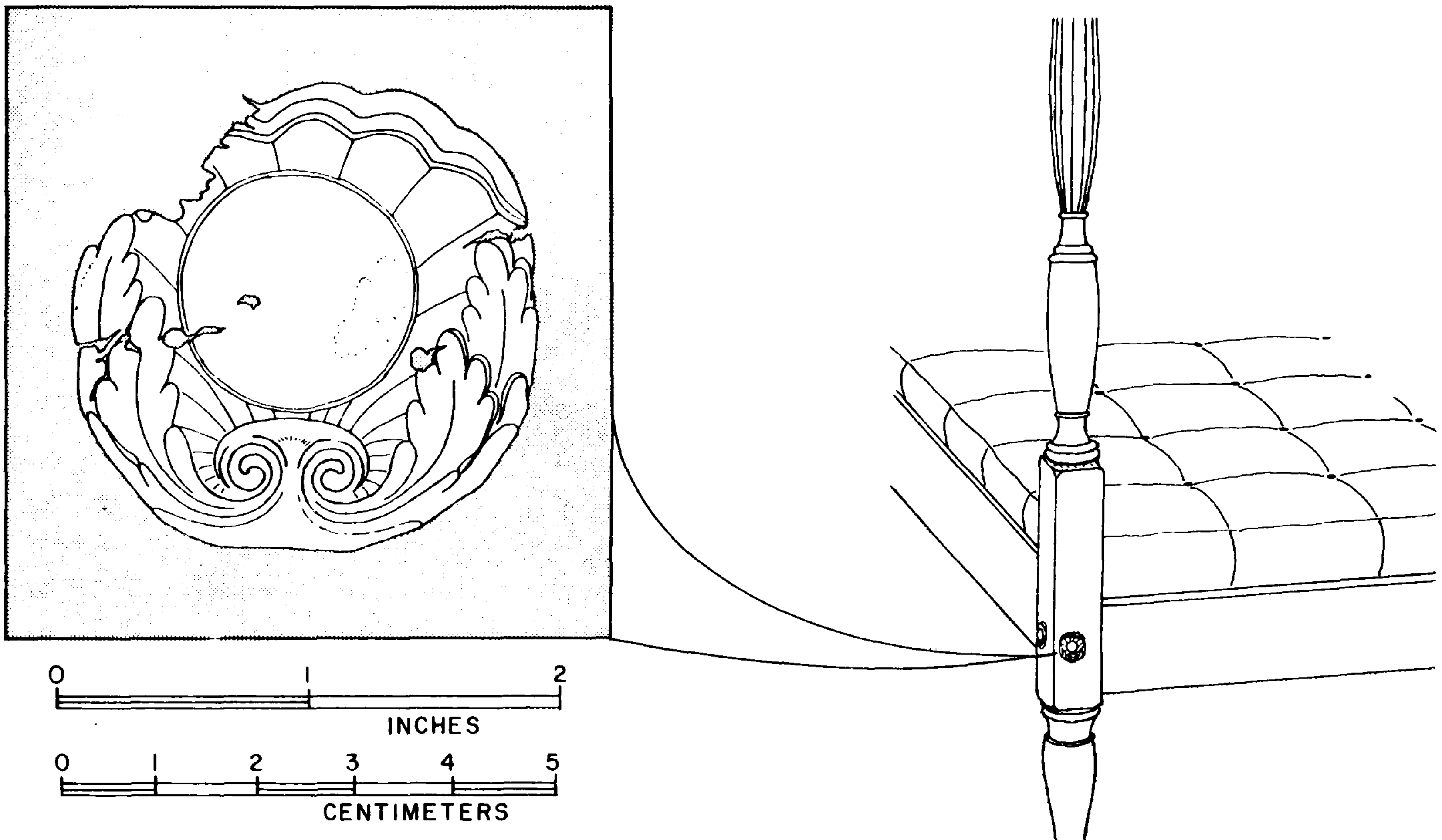


Figure 25
DECORATIVE FURNITURE BOLT COVER

Both St. Julien and St. Estephe are known for their regional bottlings, which are both more plentiful and cheaper than estate-bottled wines (Lichine 1963:30). Since the seals found on the Cremona are labeled with the region rather than the chateau, they are probably from one of these cheaper, blended wines which were exported in quantity to America.

Decorative Brass Furniture Bolt Cover (Lot No. 53 - Fig. 25) --
d.-1.8 inches (45 mm)

The brass boss is indicative of a change in furniture construction techniques which occurred in the nineteenth century and employed bolts rather than mortise and tenon joints. As illustrated in Fig. 25, the boss was utilized to cover the bolt head, not only on beds, but on chairs, chests, and other pieces from the late eighteenth or early nineteenth century Hepplewhite style. The bolt covers also indicate an American origin of the piece (Kovel 1965:3).

Like the other artifacts recovered from the site, the bolt cover should probably be associated with the building debris which filled the ship rather than anything in use on the steamboat. It might be inferred, then, that domestic, as well as public, structures fell to the wreckers to fill the obstructions.

Grinding Stone (postulated) (Lot No. 70 - Fig. 26) --
w.- 8 inches (203 mm), dia.- 14.5 inches (368 mm), wt.- 77 lbs 4 oz (35.77 kg)

This recovered artifact was an unusually shaped stone wheel for which no exact parallel has been found. The concave wear on the outer rim suggests that it was used as a grinding or sharpening stone. The square axle hole does not continue at the same width through the stone, indicating that a solid axle was not inserted through it. The edges of the axle hole show considerable wear on one face and almost none on the other. In addition to the square hole, four small round holes run through the wheel close to the rim.

Goblet Stem (Lot No. 1 - Fig. 27) -- h.- 2.04 inches (51 mm)

The goblet stem is unusual only from the standpoint of its composition in black glass. Wine glasses are traditionally clear to permit the inspection of the wine's color and clarity.

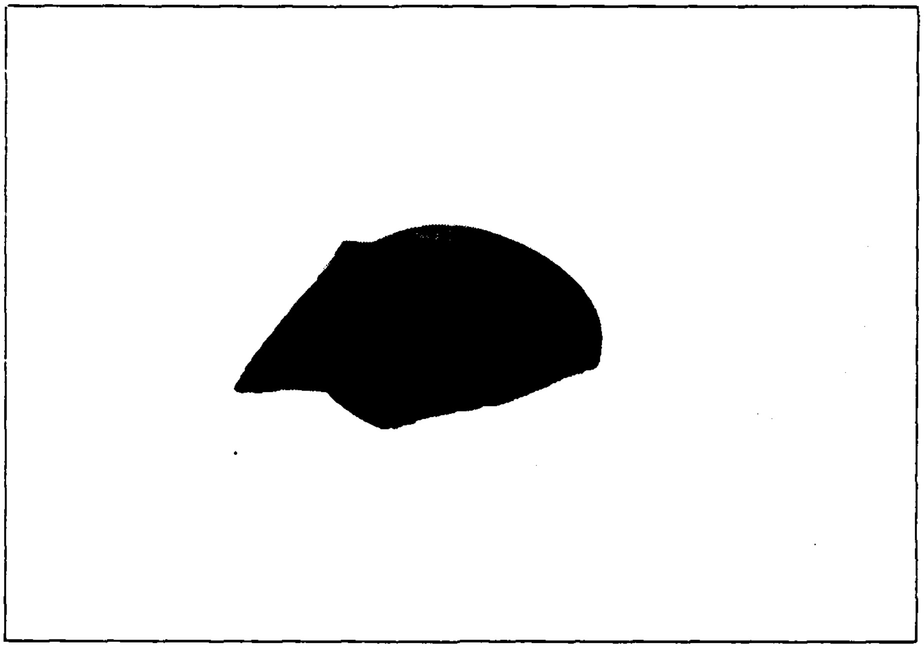


Figure 24

WINE BOTTLE SEAL

may stand either for Mariana, the matriarch of the Bonifay family, or for Manuel, Mariana's son to whom the brick yard was transferred in 1809 (Sutton N.D.:1).

The Bonifay brick yard annually produced about 145,000 bricks (Polk 1971:75). A substantial percentage of the total production was shipped to New Orleans, Tampa and Mobile. Although bricks were produced locally in Mobile, they were imported in ample quantities as well. An entry in the marine list for November 25, 1857, reports that 106,000 bricks arrived from Pensacola as a single cargo aboard the bark <u>George Thomas</u> (Mobile Daily Register 1857:3).

Military demands constituted the largest market for imported bricks into Mobile in the 1830s, with the construction of the two forts at the mouth of the bay (Polk 1971:78). Their construction dates correspond to the production dates of the Bonifay yard, which may account for the presence of these bricks in Mobile.

Brick (Lot No. 64 - Fig. 23B) -- l.-8.96 inches (224 mm), w.-
4.48 inches (112 mm), h.- 2.88 inches (72 mm)

This plain hand-made brick is unique from hundreds of other examples found in the hull in that an addition problem has been incised in one face. The numbers read:

$$
\begin{array}{c}
[\ \text{----------}\ ] \\
851 \\
\hline
4679 \\
321 \\
\hline
5000
\end{array}
$$

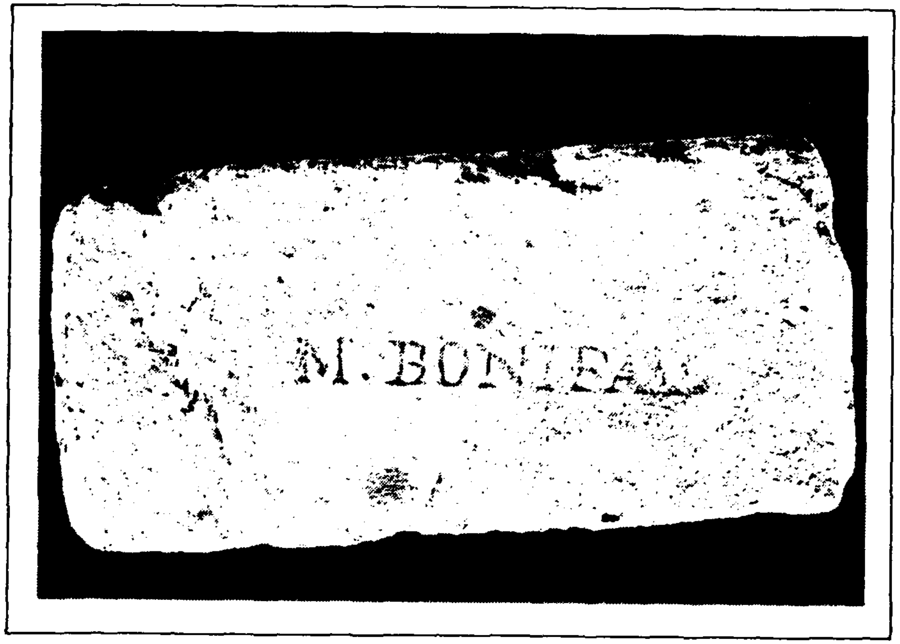
Glass Wine Bottle Seals (Lot Nos. 2, 20, 38, and 47 - Fig. 24) --
d.-1.44 inches (36 mm)

Two different imported wines are represented by five glass seals. Both wines are from the Medoc region of France and represent two distinguished wine-producing "communities": St. Julien and St. Estephe.

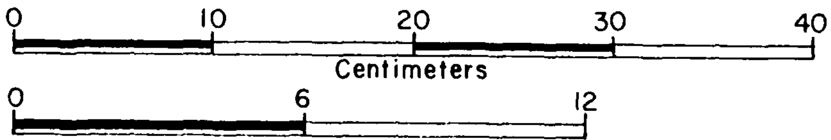
The Medoc region is a narrow strip of land north of Bordeaux which stretches along the left bank of the Gironde River. The St. Julien and St. Estephe wines are produced in the region closest to Bordeaux called the Haut-Medoc, or Upper Medoc, which is also home to the renowned Chateau Mouton-Rothchild.

No wines have been classified so much or so often as those of the Medoc, beginning in the fifteenth century. The most famous classification is the outmoded one of 1855 in which 60 Medoc vineyards were included under the official designation "crus" or exceptional (Lichine 1963:26).

"B"



"A"



Scale is for "A" only.

Figure 23
BRICKS FROM THE OBSTRUCTIONS

APPENDIX I

THE ARTIFACTS OF OBSTRUCTION

Both historical and archaeological data support the conclusion that the Cremona was stripped of her engines and upper works, loaded with debris, and intentionally scuttled. As a result, none of the recovered artifacts can, with any certainty, be assigned to the cargo and operation of the vessel previous to her sinking.

The debris which filled the hull consisted almost entirely of new and used brick, which, in some cases was still mortared together. Other recovered materials were composed of glass, iron, brass, bone, ceramics, stone and wood. Because the materials are largely unrelated to the function or construction of the vessel, they cannot be applied to the archaeological interpretation of the hull. It is far more likely that they were part of the debris from burned and destroyed buildings which was loaded into the hulls. There was no particular stratification of artifacts or concentrations in places such as the bilge which could be used to differentiate cargo remains from building debris. Because of this circumstance, the artifacts are not employed in an interpretive sense, but rather are presented as representative of the kinds of material in general use during the war.

A list of the materials and their provenience is presented in Table 2, followed by a brief discussion of the few diagnostic artifacts. It will be observed from this table that the great preponderence of artifacts was recovered from Trench A, with only a few from Trench C, and only a structural part from Trench B. This phenomenon is due primarily to the size of the trench and the type of deposit. Trench A was, by far, the largest excavation unit and it penetrated an undisturbed deposit of brick. Trench B, in the bow section of the vessel, was excavated in an area of the boat which had collapsed away from the main deposit. Trench C was again excavated through undisturbed material, but far less of it was removed than in Trench A. The inventory also reflects, to a limited extent, a difference in collection technique between the three units. For instance, a representative sample of brick was collected from Trench A. Duplicate bricks from other trenches were not collected although they were most certainly present. All other artifacts, aside from bricks, were collected in all three trenches.

ANALYSIS

M. Bonifay Brick (Lot No. 63 - Fig. 23A) -- l.- 8.32 inches (208 mm), w.- 3.92 inches (98 mm), h.- 2.24 inches (56 mm)

Bricks with the stamp "M. Bonifay" were produced in Pensacola, Florida, between 1807 and the 1830s (Simons 1984:23). The initial "M"

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APPENDIX III

DEFINITIONS OF SHIPBUILDING TERMS

ceiling - planking laid across the floor frames to keep cargo out of the bilge.

chine - the intersection of the bottom and the sides of a flat bottom boat.

floor frames - frames or ribs that span the bottom of the hull.

futtock - frames that fit along the sides of the hull.

guard - extension of the deck beyond the sides of the hull of a river steamboat to increase cargo space.

keelson - longitudinal timber running down the center of the interior of the hull in order to stiffen and strengthen its framework.

scarf - to join two timbers by sloping off the ends of each and fastening them together so they make one piece of uniform size.

scow bow - a type of bow found on low water packets in the 19th century in which the bottom curves upward, but there is little or no reduction in the width of the hull, giving it an appearance like a modern barge.

strake - a line of planking extending the length of the vessel.

stringer - a longitudinal timber, subordinate to the keelson, which serves to stiffen the hull.

transom - the planking forming the stern of a square-ended boat.

treenail - a wooden peg used as a fastener, pronounced "trunnel".

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